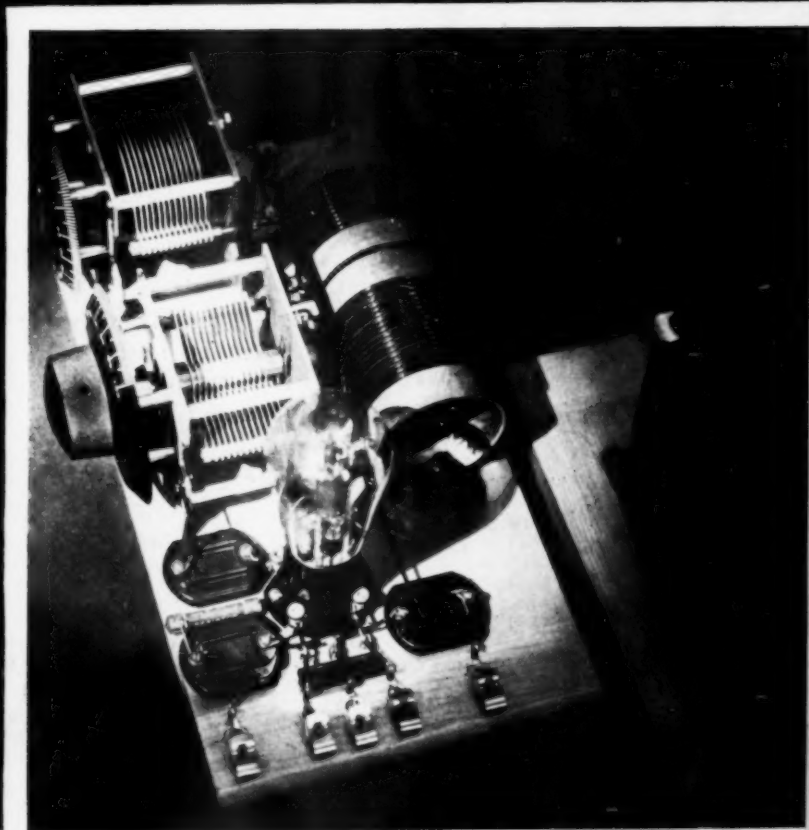


QST 

amateur radio



Indispensable!

● The teacher had asked for a synonym for "indispensable." And Johnny Jones — bless his little heart — went to the head of the class (and quite rightly, too!) when his answer was

The **Radio Amateur's HANDBOOK** *Ninth Edition*

BY
THE
HEADQUARTERS
STAFF
OF
THE
A.R.R.L.

THE BIGGEST DOLLAR'S WORTH IN RADIO

But more than that, the manual that no radio amateur, whether he be beginner, advanced amateur, experimenter, traffic handler or 'phone man, can afford to be without. Everything about amateur radio, from getting started and obtaining licenses to building and operating transmitters and receivers of every description, assembling power supplies, designing antennas and building and using monitors and frequency meters.

ORDER YOURS TODAY!

Oriole-and-Gold Paper Cover

\$1

(Stiff Buckram Binding \$2.00)

POSTPAID ANYWHERE

**AMERICAN RADIO
RELAY LEAGUE**

**WEST HARTFORD
CONNECTICUT**

U.S.A.

QST

Published monthly, as its
official organ, by the Amer-
ican Radio Relay League,
Inc., at West Hartford,
Conn., U. S. A.; Official
Organ of the Internation-
al Amateur Radio Union

devoted entirely to AMATEUR RADIO

Contents

Editorial	7
A Low-Power 1715-Kc. C. W. Transmitter	George Grammer 8
Election Notice	10
A Cigar-Box Super-Regenerative Receiver	Walter van B. Roberts 11
Midwest Division Convention	(Announcement) 12
Changing Over to the New 'Phone Bands	James J. Lamb 13
Eliminating Interference Caused by Electrical Equipment	Absalon Larsen 16
Silver Electrodes on Quartz Plates	George S. Parsons 20
'Phone Operator's Examination Ready	K. B. Warner 21
An Effective Power-Type Frequency Multiplier	H. S. Keen, W2CTK 22
A Change in A.R.R.L. QSL-Card Service	A. L. Budlong 24
The First Filter Choke — Its Effect on Regulation and Smoothing	F. S. Dellenbaugh, Jr., and R. S. Quimby 26
Temperature and Monitor Calibration	Thomas S. Wildman, W9DIB 31
Financial Statement	32
Radio Efficiency?	Victor L. Osgood 33
More About Audio Selectivity	L. W. Hatry 34
Putting Life in the QSL Card	Louis F. Leuck, W9ANZ 36
Standard Frequency Transmissions Revised for New 'Phone Bands	37
Strays	38
Attention, Music Transmitters!	39
The Old Timer Hangs a New Sky-Wire	Eugene A. Hubbell, W9ERU 40
Experimenters' Section	43
FREQUENCY DOUBLING, VOLTAGE REGULATION, VACUUM-TUBE BLEEDER RESISTANCE, CURING NOISY GROUNDS, SOME CONVERTER HINTS, FILAMENT VOLTAGE COMPENSATION	
Amateur Radio Stations	W3RV, W8DWJ, W2ABE 45
The Communications Department	47
I.A.R.U. News	61
Calls Heard	63
Correspondence Department	66
Hamads and QRAs	91
QST's Index of Advertisers	94

MARCH
1932

VOLUME XVI
NUMBER 3

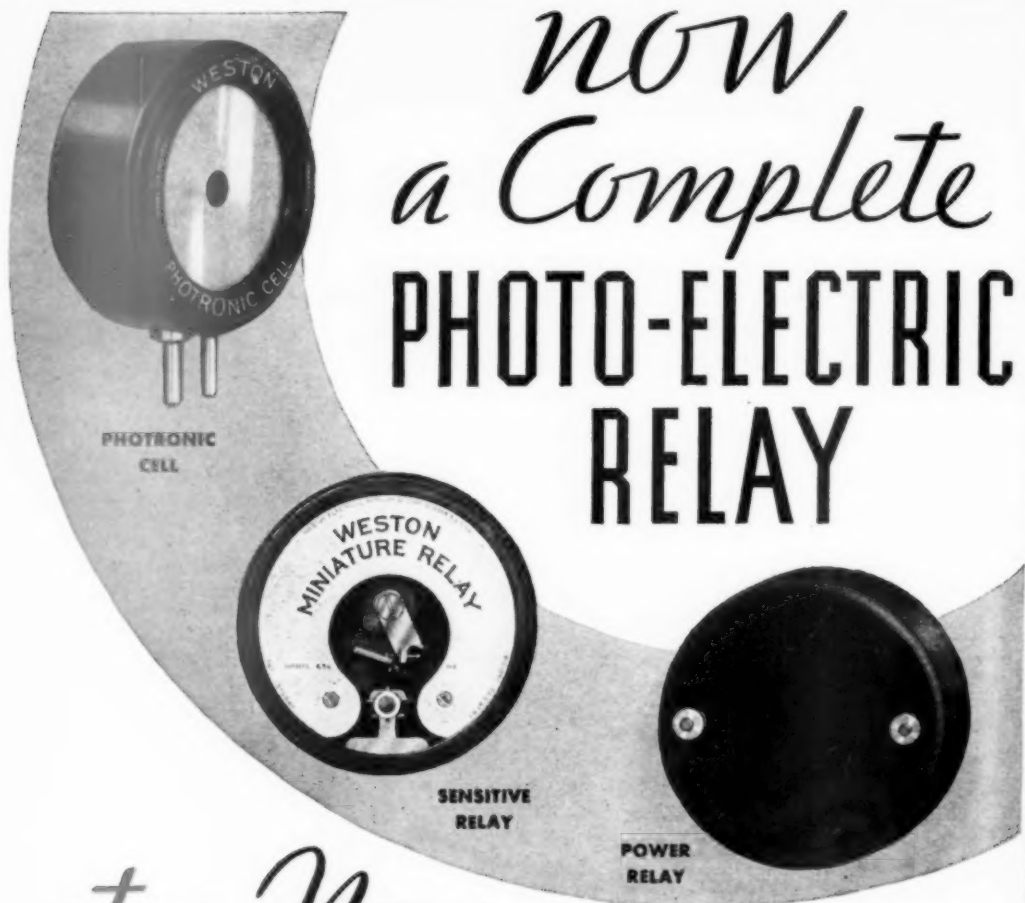
Kenneth B. Warner (Secretary, A.R.R.L.), Editor-in-Chief and Business Manager; Ross A. Hull, Associate Editor; James J. Lamb, Technical Editor; George Grammer, Assistant Technical Editor; Clark C. Rodimon, Managing Editor; David H. Houghton, Circulation Manager; G. Donald Meserve, Advertising Manager; Ursula M. Chamberlain, Assistant Advertising Manager.

Advertising Offices 55 West 42d Street, New York City
Editorial Offices 38 La Salle Road, West Hartford, Conn.

Subscription rate in United States and Possessions, Canada, and all countries in the American Postal Union, \$2.50 per year, postpaid. Single copies, 25 cents. Foreign countries not in American Postal Union, \$3.00 per year, postpaid. Remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.

Entered as second-class matter May 29, 1919, at the post office at Hartford, Connecticut, under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized September 9, 1922. Additional entry at Concord, N. H., authorized February 21, 1929, under the Act of February 28, 1925.

Copyright 1932 by the American Radio Relay League, Inc.
Title registered at United States Patent Office.



Now you can experiment with light sensitive cells—make them work at a fraction of previous costs. The new Weston Photronic Cell uses no battery, no amplifier. It operates relays directly. Highly sensitive, its current output is about 1.4 microamperes per foot-candle. No dark current.

The Photronic Cell has unlimited life—no deterioration, no replacement. A marked advance over previous standards.

WESTON

ELECTRICAL INSTRUMENT CORPORATION

602 FRELINGHUYSEN AVENUE NEWARK, N. J.

LOW COST

For the experimenter, Weston recommends its Model 601 Photronic Relay. It controls 100 watts. It consists of a Photronic Cell, a Model 634 Weston Miniature Relay, and a Power Relay. Used with dry cells to actuate power relay, Model 601 Photronic Relay is a complete operating unit, permitting hundreds of interesting and practical experiments.

WRITE TODAY for FREE Booklet showing ten Photronic Relay experiments. Wiring diagrams included.

Say You Saw It in QST — It Identifies You and Helps QST

East
Mar
of
South
West

Illino
India
Kent
Mich
Ohio
Wisc

North
South
North
South

Arkai
Louis
Missi
Tenne

Easte
N. Y.
North

Iowa
Kansa
Missou
Nebras

Conne
Maine
Easte
Weste
New H
Rhode
Vermont

Alaska
Idaho
Montan
Oregon

Washing

Hawaii
Nevada
Los Ang
Santa C
East Ba
San Fra
Sacrame
Arizona
Philippi
San Die
San Joa

North C
Virginia
West Vir

Colorado
Utah-Wy

Alabama
Eastern
Western
Georgia-S
Ile-of-V
Virgin

Northern
Oklahom
Southern
New Mex

Maritime

Ontario

Quebec

Alberta
British Co

Manitoba
Saskatche

* Official

Section Communication Managers of THE COMMUNICATIONS DEPARTMENT, A. R. R. L.

Eastern Pennsylvania Maryland-Delaware-District of Columbia Southern New Jersey Western New York Western Pennsylvania	W3GS W3NY W3SM W8DSP W8CFR	ATLANTIC DIVISION Jack Wagenseller Harry Ginsberg Robert Adams, 3rd Don Farrell Robert Lloyd	210 Main St. 2305 N. Pulaski St. 1302 Keawick Ave. 213 Hickok Ave. 175 Allegheny Ave.	Pennsburg Baltimore, Md. Haddon Heights Syracuse Emsworth (Pgh) Pa.
Illinois Indiana Kentucky Michigan Ohio Wisconsin	W9APY W9BKJ W9BAZ W8DMS W8BAH W9VD	CENTRAL DIVISION Fred J. Hinds George Graue J. B. Wathen, III R. J. Stephenson Harry A. Tummonds C. N. Crapo	3337 Oak Park Blvd. 824 Home Ave. Mockingbird Valley 216 Florence Ave. 2073 West 85th St. 2111 E. Newton Ave.	Berwyn Fort Wayne Louisville Highland Park Cleveland Milwaukee
North Dakota South Dakota Northern Minnesota Southern Minnesota	W9BVF W9DNS W9CTW W9AIR	DAKOTA DIVISION Guy L. Ottinger Howard Cashman Raymond Weihe Herman Radloff	326 6th Ave., So. 121 N. Spring Ave. E. 3rd St. R. 2, Box 15	Jamestown Sioux Falls Jackson Sleepy Eye
Arkansas Louisiana Mississippi Tennessee	W5ABI W5WF W5AZV W4SP	DELTA DIVISION H. E. Velte F. M. Watts, Jr. William G. Bodker James B. Witt	4017 West 10th St. 1716 Park Ave. 208 W. Elm St. 832 N. Fifth Ave.	Little Rock Shreveport Jackson Knoxville
Eastern New York N. Y. C. & Long Island Northern New Jersey	W2LU W2BGO W2WR	HUDSON DIVISION Robert E. Haight V. T. Kenney A. G. Wester, Jr.	1080 Helderberg Ave. 3330 Fenton Ave. 50 Princeton St.	Schenectady Bronx, N. Y. C. Maplewood
Iowa Kansas Missouri Nebraska	W9FFD W9CET W9RR W9FAM	MIDWEST DIVISION George D. Hansen J. H. Amis L. B. Laizure Samuel C. Wallace	Box 27 915 Lincoln Ave. 8010 Mercier St. Green St.	Salix Topeka Kansas City Clarks
Connecticut Maine Eastern Massachusetts Western Massachusetts New Hampshire Rhode Island Vermont	W1CTI W1CDX W1ASI W1JVV W1ATJ W1AWE W1BD	NEW ENGLAND DIVISION Frederick Ella, Jr. John W. Singleton Joseph A. Mullen Leo R. Peloquin V. W. Hodge N. H. Miller Roy Gale	19 Merrill Rd. Box 161 16 Mercier St. 24 Arthur St. 227 Main St. 25 Phillips St. 41 Beacon St.	Norwalk Machias Ashmont Worcester Claremont Providence Barre
Alaska Idaho Montana Oregon Washington	WWDN W7AKZ W7AAT-7QT W7ALO W7RT	NORTHWESTERN DIVISION W. B. Wilson Oscar E. Johnson O. W. Viers Dr. Dolph L. Craig John P. Gruble	U. S. LHT Fern 422 Antone St. 701 First National Bank Bldg. 1921 Atlantic St.	Ketchikan Sandpoint Red Lodge Salem Seattle
Hawaii * Nevada Los Angeles Santa Clara Valley East Bay * San Francisco Sacramento Valley Arizona Philippines * San Diego San Joaquin Valley	K6COG W6EAD W6HT W6NX W6BSB W6WB W6AXM W6BJF KALSL W6EOP W6BVV	PACIFIC DIVISION C. D. Slaten Keston L. Ramsay H. E. Nahmens F. J. Quemant H. L. Bassett C. F. Bane Paul S. Farrelle Ernest Mendoza J. S. Liner Harry A. Ambler E. J. Beall	Pearl City 1151 Buena Vista Ave. Box 903 1348 Hanchett Ave. 350 50th St. 262 Castro St. 1326 P St. 1434 East Madison St. Care Manila Bulletin 4101 Hamilton St. Box 246	Oahu Reno Long Beach San Jose Oakland San Francisco Sacramento Phoenix Manila, P. I. San Diego Newman
North Carolina Virginia West Virginia	W4DW W3AAJ W8HD	ROANOKE DIVISION H. L. Caviness R. N. Eubank C. S. Hoffman, Jr.	State College 2817 Montrose Ave. 126 Washington Ave.	Raleigh Richmond Wheeling
Colorado Utah-Wyoming	W9ESA W6DPJ	ROCKY MOUNTAIN DIVISION Edward C. Stockman C. R. Miller	618 So. Williams St. 134 E. 2nd North St.	Denver Provo, Utah
Alabama Eastern Florida Western Florida Georgia-So. Carolina-Cuba- Isle-of-Pines-Porto Rico- Virgin Islands	W4AHP W4NN W4MS W4SS	SOUTHEASTERN DIVISION Robt. E. Troy, Jr. Ray Atkinson Edward J. Collins J. C. Hagler, Jr.	516 Cloverdale Rd. 43 East 59th St. 516 North Palafox St. 2424 McDowell St.	Montgomery Jacksonville Pensacola Augusta
Northern Texas Oklahoma Southern Texas New Mexico	W5RJ W5GF W5ZG W5AUW	WEST GULF DIVISION Roy Lee Taylor W. J. Gentry H. C. Sherrod Jerry Quinn	1614 St. Louis Ave. 538 N. Pottenger St. 1906 Wheeler St. 524 West Coal Ave.	Ft. Worth Shawnee Houston Albuquerque
Maritime	VE1DQ	MARITIME DIVISION A. M. Crowell	69 Dublin St.	Halifax, N. S.
Ontario	VE3HB	ONTARIO DIVISION H. W. Bishop	253 Elgin St.	London
Quebec	VE2AC	QUEBEC DIVISION Alphy Blais	Box 221	Thetford Mines
Alberta British Columbia	VE4EC VE5AL	VANALTA DIVISION Fred Barron J. K. Cavalsky	Warwick Apts., 95th St. 4868 Blenheim St.	Edmonton Vancouver
Manitoba Saskatchewan	VE4BQ VE4FC	PRAIRIE DIVISION John L. Green W. J. Pickering	115 Furby St. 514 19th St., W.	Winnipeg Prince Albert

* Officials appointed to act until the membership of the Section choose permanent SCM's by nomination and election.

The American Radio Relay League

DIRECTORS

<i>President</i>	
HIRAM PERCY MAXIM.....	W1AW
Drawer 2102, Hartford, Conn.	
<i>Vice-President</i>	
CHARLES H. STEWART.....	W3ZS
St. David's, Pa.	
<i>Canadian General Manager</i>	
ALEX. REID.....	VE2BE
169 Logan Ave., St. Lambert, P. Q.	
<i>Atlantic Division</i>	
EUGENE C. WOODRUFF.....	W8CMP
234 W. Fairmount Ave., State College, Pa.	
<i>Central Division</i>	
LOREN G. WINDOM.....	W8GZ-W8ZG
1375 Franklin Ave., Columbus, Ohio	
<i>Dakota Division</i>	
LAWRENCE E. LINDESMITH.....	W9GKO
1055-85th Ave. W., Duluth, Minn.	
<i>Delta Division</i>	
M. M. HILL.....	W5EB
P.O. Box 274, Natchitoches, La.	
<i>Hudson Division</i>	
A. LAFAYETTE WALSH.....	W2BW
220 West 42d St., New York City	
<i>Midwest Division</i>	
H. W. KERR.....	W9DZW-W9GP
Little Sioux, Iowa	
<i>New England Division</i>	
FREDERICK BEST.....	W1BIG
13 East Crescent St., Augusta, Maine	
<i>Northwestern Division</i>	
K. W. WEINGARTEN.....	W7BG
3219 No. 24th St., Tacoma, Wash.	
<i>Pacific Division</i>	
CLAIR FOSTER.....	W6HM
Carmel, Calif.	
<i>Roanoke Division</i>	
W. TREDWAY GRAVELY.....	W3BZ
Box 245, Danville, Va.	
<i>Rocky Mountain Division</i>	
RUSSELL J. ANDREWS.....	W9AAB
169 So. Ogden St., Denver, Colo.	
<i>Southeastern Division</i>	
J. C. HAGLER, JR.....	W4SS
2424 McDowell St., Augusta, Ga.	
<i>West Gulf Division</i>	
FRANK M. CORLETT.....	W5ZC
2515 Catherine St., Dallas, Tex.	

THE AMERICAN RADIO

RELAY LEAGUE, INC., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is non-commercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the world and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite. Correspondence should be addressed to the Secretary.

OFFICERS

<i>President</i>	HIRAM PERCY MAXIM, W1AW
	Hartford, Connecticut
<i>Vice-President</i>	CHARLES H. STEWART, W3ZS
	St. David's, Pennsylvania
<i>Secretary</i>	KENNETH B. WARNER, W1EH
	West Hartford, Connecticut
<i>Treasurer</i>	ARTHUR A. HEBERT, W1EN
	West Hartford, Connecticut
<i>Communications Mgr.</i> , F. EDWARD HANDY, W1BDI	West Hartford, Connecticut
<i>General Counsel</i>	PAUL M. SEGAL, W3EEA
	1010 Shoreham Building, Washington, D. C.

Address All General Correspondence to THE EXECUTIVE HEADQUARTERS at West Hartford, Connecticut

• EDITORIAL •

THE accomplishments of amateur radio appeal to the public imagination. The assistance of an army of observers and experimenters is invaluable to those who obtain it. The service of communication provided by amateurs is technically expert, it is free, and frequently it is the only means available. It is no wonder, then, that all manner of enterprises are constantly seeking the collaboration of the amateur.

In the majority of these enterprises we have an opportunity for public service and for an interesting activity, but they likewise involve our duty to ourselves as amateurs and they require that we take a careful look at the propositions from all angles before we lend our aid. There is a steady flow of such requests into our headquarters office. Here they are carefully examined by our communications department, their merit determined, their operating interest assayed. The good ones are embraced, the others rejected. You read in *QST* and in the O.R.S. bulletins about the meritorious ones that we know are worthy, in the name of science, public service or intriguing operating opportunity, of our support.

Occasionally there are "propositions" of a different complexion. To some we reluctantly deny our coöperation because the proposed activity, while entirely above-board, is simply without any interest to amateurs. Such, for instance, as finding several thousand amateurs who would build special loop equipment and undertake to log several observations a day for a year or so on the apparent direction of static. But there are others that we turn down because they are improper, because they represent some more or less cleverly disguised attempt to "use" us to our disadvantage in somebody's axe-grinding scheme. We had a good example of that recently when a group of newspapers who have lost advertising to broadcasting, set out to lambaste the daylights out of the present structure of broadcasting with the idea of turning things topsy-turvy and running the Federal Radio Commission ragged — to demolish present-day broadcasting to gain some business advantage to themselves. It was part of their plan to enlist the coöperation of the amateur group, offering us publicity and support in return. Naturally we declined to associate ourselves with any such move, for as radio amateurs we have no quarrel with broadcasting or the Commission and it would be insane to bring down on our necks the wrath of other groups in radio by treading upon them unnecessarily. Yet these people still aspire to amateur participation in their campaign and are telling their associates over the country to establish contact with local amateurs, who will coöperate if the amateur cause is championed. We like publicity and support, all right, but not at that price.

The point of all this is that if you are not sure about some request you have received for amateur coöperation, write to A.R.R.L. Hq. for advice and the "low-down" on it. Every amateur is a free agent, responsible only to the Government for compliance with law and regulation, legally entitled of course to do anything he pleases within these limits. But why let yourself be "used" as a chestnut-puller by unscrupulous or misguided interests to the injury of all of amateur radio, especially when it's so easy to find out for sure?

Perhaps we should warn against applying any such caution in cases of bona-fide distress or community emergency. The rule in such cases of course is to take one quick look to see that it looks genuine, then act, and do the thinking about it afterwards.

K. B. W.

A Low-Power 1715-kc. C. W. Transmitter

By George Grammer, Assistant Technical Editor

WHETHER or not the sun-spot cycle is responsible, it is an undoubted fact that during the past year or so amateur activities have shown a decided swing toward the lower frequencies. The eccentricities of "20" and "40" have driven a great many stations to "80," and the peculiar antics of the latter band lately have been responsible for the construction of more than one "160-meter" c.w. transmitter. The last-named band seems to be the only one in which reliable communication can be held over moderate distances at night, which just about duplicates the conditions existing back in 1923 and '24 when the big parade to the "short waves" was in full swing.

All of which brings us to believe that the group of frequencies between 1715 and 2000 kc. is a pretty nice piece of territory. It is an especially good place for beginning amateurs, not only because skip-distance effects are almost absent, but also because, in comparison with the other amateur bands, it is practically free from QRM. This in itself is a tremendous point in favor of the 1715-kc. band, particularly because most beginners start out with transmitters of relatively low power and often find it difficult to make a dent in the interference on the higher frequencies.

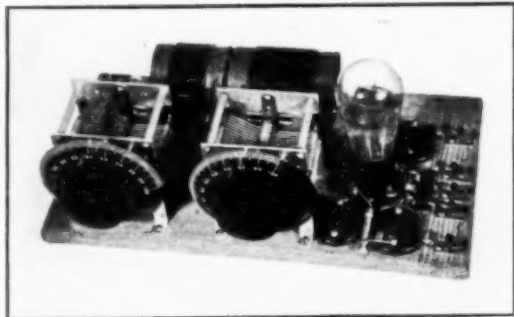
For this reason the transmitter described here, designed especially for beginners, is built to work in the 1715-kc. band. Because it is a beginner's outfit it uses about the minimum of parts and is therefore inexpensive and simple to construct, although capable of producing a signal which will comply fully with the amateur regulations. On the other hand, even the old timer can find it a handy gadget for local rag-chews and short-distance traffic handling.

The circuit, Fig. 1, is a series-feed arrangement of the Hartley. As the diagram shows, no radio-frequency chokes or filament by-pass condensers are required, resulting in a substantial simplification of the set. The oscillator tube, a Type '45, will deliver 5 or 6 watts to the antenna. The parts should be laid out on a 7- by 14-inch baseboard about as indicated in the photographs, this layout giving decently short leads without undue

crowding of the apparatus. The antenna tuning condenser is at the left-hand end of the board with the oscillator or "tank" condenser alongside it at the right. The remainder of the space is taken up by the tube socket, fixed by-pass condensers, grid-leak resistor, filament center-tap resistor and the Fahnestock clips for making connections. The coils, of course, are in back of the variable condensers.

WINDING THE COILS

It is a little difficult to find much to say about the construction of the set which is not already clearly shown in the photographs. There is very little wiring to do, and that of the easiest kind. Perhaps the hardest job is making a pair of ship-shape coils, although even that is simple enough if one goes about it right. To make the tank coil, procure a piece of bakelite tubing $2\frac{1}{2}$ inches in diameter and $3\frac{1}{2}$ inches long. Draw a straight



SIMPLICITY OF CONSTRUCTION AND OPERATION ARE FEATURES OF THIS TRANSMITTING SET

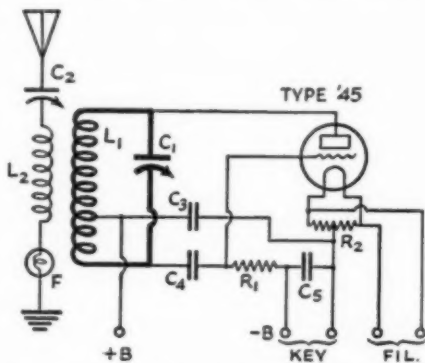


FIG. 1.—THE TRANSMITTER CIRCUIT—A HARTLEY ARRANGED FOR SERIES PLATE FEED

- C₁—500- μ fd. (.0005- μ fd.) receiving condenser.
- C₂—Same as C₁.
- C₃—250- μ fd. fixed mica condenser.
- C₄—250- μ fd. (.00025- μ fd.) fixed mica condenser.
- C₅—.005- μ fd. fixed mica condenser.
- R₁—50,000-ohm resistor.
- R₂—20-ohm center-tapped resistor.
- F—Flashlight bulb.
- L₁—18 turns of No. 12 enamelled wire on $2\frac{1}{2}$ -inch form, spaced to occupy $2\frac{1}{2}$ inches.
- L₂—12 turns of No. 12 enamelled wire on $2\frac{1}{2}$ -inch form, spaced to occupy $1\frac{3}{4}$ inches.

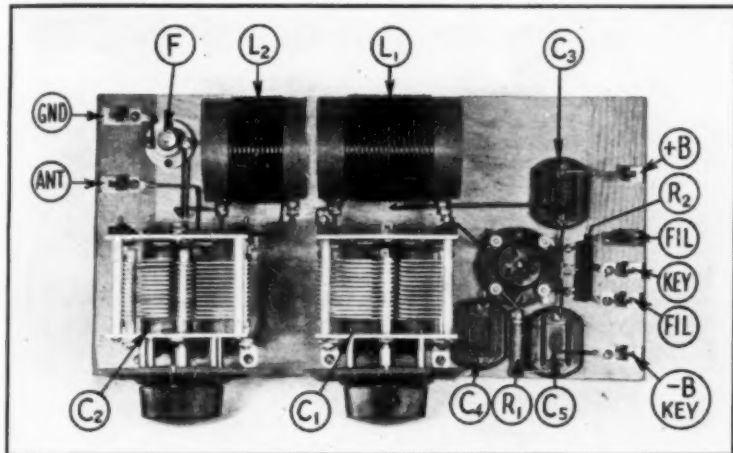
line along the length of the tubing at right angles to the ends and mark a point on the line a half inch in from each end. The distance between the two points will then be $2\frac{1}{2}$ inches. Drill a $\frac{1}{8}$ -inch hole through the tubing at each point to hold a pair of half-inch 6-32 screws, to which the ends of the coil are fastened. Next cut a piece of No. 12 enamelled antenna wire long enough to make the coil (about 13 feet) and scrape the enamel off one end for a distance of about an inch. Bend this

of bus bar or wire which connects to the tap can be tinned similarly and then the job of making a good joint is quite simple.

The antenna coil is made in the same way as the oscillator coil except that a shorter piece of tubing and a smaller number of turns are used.

The two coils should be mounted as shown in the photographs, and should be placed as close together as possible. It is not necessary to make the coupling between the coils variable, since

their dimensions are such that the spacing shown will give just about the right amount. The distance between the two adjacent ends of the windings is $1\frac{1}{2}$ inches. The 8-turn side of the oscillator coil is connected to the grid end of condenser C_1 (rotary plates and frame) and the 10-turn side to the plate end (stationary plates). Both coils should be fastened solidly to the baseboard, preferably raised from it a half inch or so by means of small pieces of metal tubing or some similar means.



A TOP VIEW SHOWING WHERE EACH PART IS PLACED. THE LABELS CORRESPOND TO THOSE IN THE WIRING DIAGRAM

bright end around one of the screws and fasten it in place with a nut. Then fasten the other end of the wire in a vise or to a hook so it will be solidly anchored, pull the wire taut, and wind the coil by rotating the bakelite tube in your hands, walking toward the vise or hook as the turns are put on. When the 18th turn is completed bend the wire around the remaining screw and cut off the excess. Scrape off the enamel where the end of the wire goes around the screw and fasten it temporarily. Now take a piece of fairly heavy string and wind it between the turns of the coil. If the right thickness of string is used the entire coil will just occupy the space between the two machine screws. The string may be left in place permanently if desired, in which case it should be of the waxed variety, to make it moisture-proof. This, in fact, is a good plan because the wire is likely to slip if the string is taken out. Tightening up the nuts which hold the ends of the wire in place usually will pull the coil tight if it has not been allowed to slip during winding.

The tap on the oscillator coil is placed at the 8th turn from one end, in line with the two terminals of the coil, by scraping off the enamel for a distance of about a half inch and running solder on the bright part, taking care that none of the solder gets on the adjacent turns. The piece

POWER SUPPLY

The power supply for the transmitter should furnish 2.5 volts a.c. for lighting the filament and 300 to 400 volts d.c. for the plate. A power pack made up from broadcast replacement parts will be entirely satisfactory. Constructional details of such a power supply are contained in the November, 1930, issue of *QST*, and also in the Ninth Edition of *The Radio Amateur's Handbook*.

As a preliminary test the power supply and key should be connected to the set to check for oscillation. The oscillator condenser, C_1 , should be set with the rotary plates all "in." With the key closed, touch a pencil to the stationary plates and if an appreciable spark appears the set is oscillating. If there are no signs of oscillation check over the wiring for mistakes. If the wiring appears to be correct another tube should be tried. There is little to go wrong if the construction shown in the photographs and wiring diagram is followed carefully.

TUNING

The transmitter is intended to be used with an antenna and ground. The antenna may be a single wire such as those used with broadcast receivers, and should be at least 120 feet long

counting the total length from the transmitter to the open end. Lengths up to 160 feet may be used. The shape of the antenna is not a matter of great importance; it should be kept in a space by itself as much as possible, of course, and should be fairly straight except for the lead-in, but if these conditions cannot be fulfilled the reduction in radiation should not be very harmful. The ground lead should be short. The "ground" may be a buried metal rod or else the water or steam circulation system of the building. In the latter case the connection may be made by means of an ordinary ground clamp to a cold water pipe or a radiator in the heating system. The pipe should be sandpapered until bright before the clamp is installed.

If the specifications, particularly those for C_1 and L_1 , have been followed very carefully the low-frequency end of the 1715-ke. band will be reached with the plates of C_1 just about fully interleaved. The entire band will be covered in the last 10 or 15 dial divisions. Of course before going on the air the frequency should be checked carefully to make sure it is inside the band. Any one of several simple methods of frequency checking can be used, repetition of these being unnecessary in this article.¹ Once the frequency has been set the antenna circuit is brought into resonance by adjusting C_2 until the flashlight lamp shows the brightest glow. The lamp should then be cut out of the circuit by connecting a short piece of wire between the terminals on the lamp base, and the transmitter is all ready to go.

It is hard to make any predictions as to the range of a transmitter of this type. With a reasonably well-located antenna and a good ground connection it should be good for distance up to 100 miles or so in daytime and up to 500 at night.

NOTE. — This transmitter is intended for c.w. (code) only and is not suitable for radiotelephony.

¹ Frequency measuring methods are fully described in *The Radio Amateur's Handbook*. Simple methods of correctly tuning this transmitter are described in *How to Become a Radio Amateur*, a booklet which also gives complete instructions for building an inexpensive receiver and power supply, as well as instructions on how to learn the code, obtain licenses, and other information of interest to beginners. It can be obtained from the American Radio Relay League, Inc., West Hartford, Conn., for twenty-five cents.

ELECTION NOTICE

To all A.R.R.L. Members Residing in the NEW ENGLAND DIVISION:

1. You are hereby notified that Frederick Best has resigned as A.R.R.L. Director from the New England Division, because of removal from the said division, the resignation to become effective upon the election of his successor. You are also notified that a special election for A.R.R.L. Director is about to be held in the New England Division to fill the remainder of the 1931-1932

term left vacant by this resignation. Your attention is invited to Section 1 of Article IV of the constitution, providing for the government of A.R.R.L. affairs by a Board of Directors; Section 2 of Article IV defining their eligibility; and By-Laws 10 to 19 providing for their nomination and election. Copy of the Constitution & By-Laws will be mailed any member upon request.

2. The election will take place during the month between March 15 and April 15, 1932, on ballots which will be mailed from Headquarters in the first week of that period. The ballots will list the names of all eligible candidates nominated for the position by A.R.R.L. New England Division members.

3. Nominating petitions are hereby solicited. Ten or more A.R.R.L. members of the New England Division have the right to nominate any member of the League in that division as a candidate for director therefrom. The following nominating form is suggested:

(Place and date)

*Executive Committee,
American Radio Relay League,
West Hartford, Conn.*

Gentlemen:

We, the undersigned members of the A.R.R.L. residing in the New England Division, hereby nominate of as a candidate for director from this division for the remainder of the 1931-1932 term.

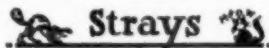
(signatures and addresses)

The signers must be League members in good standing. The nominee must be a League member in good standing and must be without commercial radio connections. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of March 15, 1932. There is no limit on the number of petitions that may be filed, but no member shall append his signature to more than one such petition.

4. This election is the constitutional opportunity for members to put the man of their choice in office as the representative of their division. They are urged to take the initiative and file nominating petitions immediately.

For the Executive Committee:

K. B. WARNER, *Secretary*.
West Hartford, Conn., January 15, 1932.



Evaporating off the magnesium film on the glass envelope of tubes is effective in clearing up any stray gas. The glass is heated gently until the silver coating has disappeared or redeposited on cooler portions of the tube. This may be repeated until the minimum of gas is present. It has worked in a number of cases where the tubes, mainly 210's, have gone "blue."

— W2CGL

A Cigar-Box Super-Regenerative Receiver

By Walter van B. Roberts*

FOR some purposes compactness and lightness are of paramount importance in portable radio receivers. Compactness, for example, is essential if the receiver is to be conveniently carried upon the person during operation, while lightness is necessary in many cases, such as mountain climbing or hiking, for reception in gliders, military communication, etc. As a result

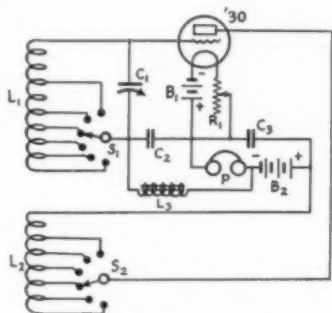


FIG. 1.—THE COLPITTS INTERRUPTION-FREQUENCY TUNED CIRCUIT IS MADE UP OF THE INDUCTANCE L_1 AND THE FIXED CONDENSERS C_1 AND C_3

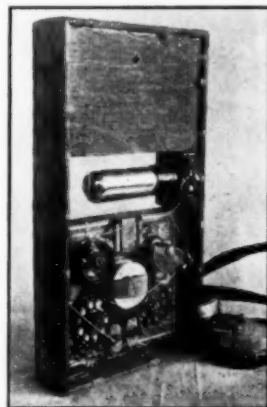
The signal-frequency inductances L_1 and L_2 are wound on the frame of the receiver and serve also as the antenna.

- C_1 — 50- μ fd. midget variable condenser.
- C_2 — 0.012- μ fd. fixed mica condenser.
- C_3 — 0.006- μ fd. fixed mica condenser.
- L_1 — Grid coil, 40 turns tapped at 9, 12, 15, 20, 26, 32 and 40 turns from grid end.
- L_2 — Plate coil, 17 turns tapped every turn from 9th to 17th, inclusive, from "B" battery end. The coils are wound side by side on the form which is 1½ inches "long" by 5¾ inches by 11 inches. The outer ends of the two windings go to grid and plate as shown in the diagram. A smaller form and fewer turns would be used for higher frequencies.
- L_3 — I.f. coil. See text for details.
- R_1 — 50-ohm filament rheostat.
- B_1 — Two flashlight cells (Eveready No. 950).
- B_2 — Three-cell flashlight battery (Eveready No. 751).
- S — 7-tap switch.
- S_2 — 9-tap switch.

of considerable experimentation the super-regenerative circuit used in the extremely small and light receiver shown in the accompanying photographs was evolved. This receiver, including batteries but not including the 'phones, weighs only 2 lbs. 14 oz. and is built in a cigar box whose outer dimensions are 2½ x 6½ x 11½ inches. Its satisfactory operating range is from 550 kc. to about 1000 kc., but this range could be considerably increased if a condenser of larger capacity range were used for tuning. Although no antenna is used, it is sufficiently sensitive and selective to receive speech intelligibly at Prince-

ton, New Jersey, from any one of a half-dozen broadcast stations in the New York and Philadelphia areas. It also has been used in automobiles, at football games to hear the broadcast of the game, and on a steamer 1000 miles from New York it has picked up WJZ when held near the rigging. None of the operating controls are critical. Standard parts were used throughout except for the inductance of the interruption frequency circuit and it is believed that if special parts were developed to be as small as possible, the size of the receiver could be reduced to one half the size mentioned.

Perhaps the most surprising thing about the receiver is the low voltage of the "B" battery, which is only 4½ volts. During experimentation with various types of super-regenerative circuits it was found that fair results were obtainable without any "B" battery at all, but the volume of sound was too small to be practicable, even though a number of stations were receivable. Four and a half volts were chosen as a good compromise between too little volume on the one hand and too much battery space and weight on the other. By referring to the circuit diagram, Fig. 1, it will be seen that the number of parts has been reduced to a minimum by the use of a Colpitts oscillator circuit for the interruption frequency, while the use of a tap switch on the tickler coil eliminates the necessity for moving the tickler coil, or for a throttle condenser and choke or other feed-back control. The taps on the grid coil would be unnecessary, or at any rate fewer taps would be required, if the tuning condenser was constructed to have a larger maximum capacity so as to provide a larger tuning range. The interruption frequency coil was wound on a core of thin laminated iron 1 in. x ½ in. x 1 in., enough turns of No. 35 wire



THE PLATE AND GRID COILS ARE WOUND ON THE FRAME OF THE WOODEN "CHASSIS"

They could be wound on usual forms for the higher-frequency amateur bands and a small antenna used for the pick-up. The small iron-core inductance for the interruption-frequency circuit is mounted in the center of the lower panel.

* Radio Corporation of America, 570 Lexington Ave., New York City.

being used to give a high pitched interruption frequency of the order of 3000 cycles. The choice of the tube used seems to be important; some tubes operate very much better than others.

In operating the receiver it will be found that if the regeneration control is turned up too far the i.f. oscillation will stop. In this case the regenera-

districts worked in all countries. The idea is to show a little more completely the DX worked than will a bare statement of the number of countries worked. For instance, if one ham works 90 districts in 50 countries, his record is presumably better than that of another station which has worked only 70 districts in the same number of countries.



THE CIGAR-BOX SUPER-REGENERATIVE RECEIVER
READY FOR OPERATION

tion control should be backed up until i.f. oscillation recommences.

It must be emphasized that this receiver was built for a definite purpose, and for that purpose only: To receive information with the very minimum of weight and bulk of equipment, regardless of quality of received signals or difficulty of tuning. It would, therefore, be contrary to the terms of the problem to add any extra device or weight for the purpose of eliminating the i.f. whistle from the 'phones, or to provide louder output, or the like. It is probably very desirable to develop a light and compact receiver having plenty of output of a good quality, and without any peculiarities of tuning, but that is a different problem. This receiver was designed for uses where, provided the message can be received understandably, all other considerations are of no consequence in comparison with saving an ounce of weight or an inch in size.

While the data given apply to the broadcast range, there seems to be no reason why the grid coil, tickler and possibly the i.f. coil should not be suitably reduced in inductance so as to provide operation at higher frequencies.

Strays

W1BTE suggests putting on the QSL card the letters "DW" followed by the total number of

MY CQ

I sent a little CQ
Sailing on a wave,
I know not where it landed
Nor how it did behave.

What worlds it may have sailed in,
What sights it may have seen;
What thoughts it may have whispered
To ears that were quite keen.

I can't recall that CQ,
It's gone I know not whence,
But I'll just bet it landed
Right over my back fence!

— W8CKH

EVERY TUBE ITS OWN FILTER

From an advertisement of a power tube in a recent issue of one of our technical contemporaries:

"Approximate Direct Interelectrode Capacities	
"Plate to Grid	9 microfarads
"Plate to Filament	6 microfarads
"Grid to Filament	10 microfarads."

Presumably the idea is to make it unnecessary to have any capacity at all in the plate-supply filter system!

Midwest Division Convention

Grand Island, Neb., March 26th-27th

FOR the first time Nebraska is undertaking a real-to-goodness Midwest Division A.R.R.L. Convention to be held at the Hotel Yancy, under the sponsorship of a convention committee, Roger H. Hertel, Chairman; S.C.M. Wallace and Director H. W. Kerr. The fee is \$2.50 including banquet.

Governor Bryan of Nebraska will address the hams; State Senator R. B. Howell will be present also and good speakers are assured on technical radio. Government examinations will be conducted Saturday morning and the Committee is doing its best to give you something that you will remember.

Now help us by sending in your reservation in advance to Don Griffith, 408 East 6th St., Kearny, Neb. Further information may also be obtained from Roger H. Hertel, Clay Center, Neb.

Changing Over to the New 'Phone Bands

By James J. Lamb, Technical Editor

WITH the legal and regulatory aspects of the new regulations regarding amateur 'phone adequately covered in articles by Secretary Warner in last month's and this issue of *QST*, and no doubt well digested ere this, there remains only a little touching up on the technical high lights to complete the picture. Actually, there isn't much in the way of complication justifying any sort of deep-delving technical treatment. For the most part only straightforward common-sense application of what every 'phone man already knows (or at least should know) about transmitters, crystals, antennas, frequency measurement, and whatever else might be affected, is demanded. Tank circuits need tune but a few hundred kilocycles higher; crystals require but a few swipes of grinding on a piece of plate glass smeared with the well-known carborundum mixture; antennas must have but 15 feet or so clipped from their length; and as for finding the frequency limits of the new assignments — well, no amateur has any business in 'phone operation who hasn't some kind of frequency meter, doesn't know how to check a transmitter's frequency, after all the practical information *QST* has had on frequency meter construction, calibration from standard frequency transmissions and frequency measurement in general. However, to save wear and tear on short memories, back issues of *QST* and various editions of *The Handbook*, we shall have a few practical hints and references to sources of more detailed information. But before going into the business of moving into new territory, let's look over what we have and pick out the trash that should not, in fact must not, be moved at all — or even be left operating where it is. The time is opportune for an overdue general house cleaning.

TRASHY 'PHONES

All 'phones are not good 'phones. An increasing majority is in the category of good 'phones of modern design, we know, but there is still enough of the wrong kind to make things nasty for those of the better kind. In fact, there can be little ground for disagreement with the statement that one thing that has been wrong with the amateur 'phone bands has been not so much their narrowness in terms of kilocycles but their limited capacity to accommodate both the good modern 'phones and the ether-hogging zig-zagging punk 'phones of a breed that has been obsolete since 1928, whether their operators know it or not. What is the outstanding characteristic of such relics of the dark age? High power? Not at all. Poor quality of "bodulation"? Not always. It's

frequency modulation. Why, some of those channel-swipers have enough wobble to wash out slices sufficiently wide to accommodate comfortably three times and more their number of good 'phones. Many of them sound well enough, too; at least well enough to collect a few "you sound like a broadcast station" reports in an evening of whistling and CQ'ing. That is, they seem to have "quality" — if you are not overly critical and if your receiver is not so selective as to lose them on some of their frequency slides. But they sound terrible if you are trying to copy a good stable 'phone on an adjacent channel; and they make the good signal sound terrible, too.

Modulated oscillators are the cause of the mess. That has been recognized clearly since modulated oscillators became obsolete in both amateur and broadcasting fields some four years ago. That is why no such 'phone transmitters for the amateur bands from "20 meters" to "160 meters" have been advocated by *QST* since we saw the light in 1928. True enough, such monstrosities have been described recently in other radio magazines not so well acquainted with the amateur picture. But no amateur should be led astray because of that. The most recently published example of such a piece of obsolete 'phone design that has come to our attention was a 50-watt self-excited thing *with loop modulation* — and a low-*C* tank. And it was confidently recommended as not only economical but, what is worse, as eminently suited to amateur use! Shades of the dark ages of ham 'phone! That set would need a whole amateur band for itself.

For the good of amateur 'phone all such transmitters must be eliminated from the ham bands. Amateurs who know better than to use them should point out to their less well informed brethren who do use them the evils of so doing. Only sets of the type in which modulation does not cause variation in oscillator frequency are permissible. In the present state of the art, this requirement demands some form of oscillator-amplifier set, crystal-controlled or self-controlled, in which *not* the oscillator but an amplifier is modulated. Actually, it should be noted, modulated oscillators are illegal. United States Amateur Regulation 382 states: "Licensees of amateur stations shall use adequately filtered direct-current power supply for the transmitting equipment or arrangements that produce equivalent effects to minimize frequency modulation and prevent the emission of broad signals." (Italics ours.) Modulated power supplied to an oscillator cannot, by any stretch of the wording, be translated into "adequately filtered" d.c. With every type

of self-excited oscillator that we know of, including crystal-controlled ones, modulation of the oscillator must cause frequency modulation. To secure frequency stability equivalent to that of an oscillator supplied with adequately filtered, unmodulated, direct-current power supply, it is necessary to use an oscillator-amplifier circuit and modulate only in an amplifier stage. Modulated self-excited transmitters cannot be tolerated in the new 'phone era.

Now, with the trash eliminated, let's get on to the moving.

THE 1875- TO 2000-KC. BAND

Operators who have not yet had their one year of amateur experience and who are, therefore, ineligible to qualify for unlimited amateur radio-

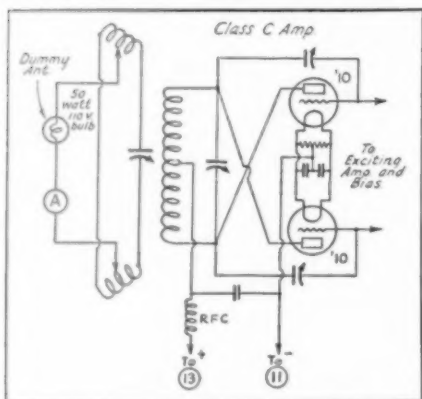


FIG. 1—UNTIL APRIL 1, 3900-4000-KC. TESTING MUST BE DONE ON A DUMMY ANTENNA LIKE THIS

telephone operation, the prerequisite for operation in the 3900- to 4000-kc. and 14,150- to 14,250-kc. bands, will be numbered among those casting towards the 1875- to 2000-kc. 'phone assignment. No special operator's 'phone qualifications are required for operation in this band. All licensed amateurs are eligible. Modifications of the equipment to make the shift in operating frequency have been completely covered in previous articles in this magazine, still available to those who do not have them already, and are also covered in *The Radio Amateur's Handbook*. To repeat them is, therefore, needless. Practically all the detailed information that anyone could need will be found in one article, "Moving into the 1750-Kc. Band," *QST*, April, 1931.¹ Antennas, inductance and condenser sizes, coil construction, receiver suggestions, frequency measurement — all are treated fully.

If crystal control is used the crystal frequency must be between 1875 and 2000 kc. A frequency "flat on" 1875 or 2000 kc. will not do because

¹ Back copies are obtainable from *QST*'s Circulation Department at 25 cents each.

the amateur assignment is between these limits and a 'phone transmitter on either one of these frequencies must have sidebands that go outside. If a crystal of lower frequency is among present possessions it can be ground to higher frequency by anyone who can make circular motions over a piece of plate glass smeared with carborundum powder mixed with water or kerosene. Details of the grinding method are given in Chapter VII of *The Radio Amateur's Handbook*. Checking the frequency at intervals during the grinding process is a simple matter. Perhaps the best way is to use a heterodyne frequency meter (calibrated oscillator), preferably one calibrated from the regular A.R.R.L. standard frequency transmissions. Such a calibration can be made readily from a 3500-kc. Schedule A transmission, an oscillator covering either the 3500- or 1750-kc. band being suitable. If the meter covers the 1750-kc. band (1715 to 2000 kc.), it is calibrated from the 3500-kc. band transmission by heterodyning its second harmonic with the s.f. signals picked up on a receiver tuned to the 3500-kc. band. The 1750-kc. band points will be half-frequency of the corresponding 3500-kc. band points; that is, 2000 kc. will coincide with 4000 kc., 1875 kc. with 3900 kc., etc. Even though your station uses a crystal-controlled transmitter, a frequency meter ought to be included in its equipment. Crystal-controlled oscillators do not always stay put and need a frequency check from time to time just as much as self-controlled types — as several 'phone operators, assisted by the Department of Commerce supervisors, have learned by experience with off-frequency crystal-controlled transmitters in recent months.

Because of the abnormal performance of frequencies around 3500 kc. that is prevalent now, many 'phone men who are qualified for unlimited operation on that band will find the 1875-kc. territory better suited to what used to be normal range for 3.5-mc. work. The new 'phone allocations are perfectly swell for this doubling up because the same crystal can be used for both bands. The fundamental of a crystal between 1875 and 2000 kc. can be used for operation in that band and its second harmonic, obtained by frequency doubling, for 3900 to 4000 kc. One antenna system will be f.b. for both bands, too. Several practicable antenna schemes for this two-band combination are shown in the 1750-kc. article referred to previously, by the way.

3900- TO 4000-KC. SUGGESTIONS

Moving from the low-frequency end to the high-frequency end of the 3500-kc. band is simply a matter of retuning. With few exceptions, tank circuits will need no more than readjustment of the tuning condensers. If, however, a tank will not come into resonance before "zero" capacity is reached it will be necessary only to cut down the inductance of the tank coil slightly,

as by removing or shorting out a turn or two.

Crystals? If of the 3500-ke. band type, grind them about 0.003-inch thinner if they are X-cut or about 0.002-inch thinner if they are Y-cut. (X-cut crystals for 3500 to 3550 ke. are approximately 0.032-inch thick and Y-cut 0.022-inch thick.) Instructions for grinding are given in the aforesaid chapter of *The Handbook*. If your preference is not to grind, the crystal can be turned over to one of *QST*'s advertisers prepared to do the job at nominal cost.

Antennas? The story is the same — prune them down a bit. Cutting off about 15 feet will drop the fundamental of the 3500 ke. Hertz radiator of a "Zepp," current-fed, or similar type, to approximately 3950 ke., for instance. Feeder lengths can be reduced proportionately, where necessary. Single- and two-wire matched-impedance (doublet) systems, whose dimensions are a little more critical than those using tuned feeders, should be designed by the same method that was used for the lower-frequency system, the complete instructions being given in Chapter XI of the same *Radio Amateur's Handbook*.

One thing we must guard against in operating 'phones in this band is the radiation of radio-frequency harmonics that may cause interference to services operating on frequencies between 7800 and 8000 ke. A push-pull output stage, carefully balanced and neutralized, loose coupling to the antenna system and a careful listening test on frequencies between 7800 and 8000 ke. at a point a mile or so from the station are urgently recommended. Harmonic radiations have been with us to some extent in the past, it is true, but they have fallen into the general ham QRM between 7000 and 7100 ke. and hence were not so noticeable. Now they will fall outside any amateur band. Watch out for them.

THE "20-METER" BAND

Every amateur qualified to operate a 'phone in the 3900- to 4000-ke. band is also privileged to use the 14,150- to 14,250-ke. 'phone allocation under the new regulations and consequently increased occupancy can be expected up there. If crystal control is used with two doublers (quadrupling frequency) the crystal should have a frequency between 3537.5 and 3562.5 ke. One frequency-tripling stage instead of two doublers will prove more economical and less complicated in many cases, and its use is recommended. Boyd Phelps' article on tripling in August, 1931, *QST*, gives some excellent suggestions. For tripling to the new "20-meter" 'phone band the crystal should have a frequency between 4716.6 and 4750 ke.

During March, and subsequently, 14,150- and 14,250-ke. points will be given in the Schedule C standard frequency transmissions. Complete schedules are contained in this issue.

"5 METERS"

Another band that cannot be overlooked is 56 to 60 mc., open to 'phone operation for all licensed amateurs and becoming increasingly popular for experimenting and local rag-chewing, now having hundreds of occupants. The equipment required is simple, doesn't cost much and is almost sure-fire as far as results are concerned. Most of the 56-mc. enthusiasts are using equipment of the type described in *QST* for July and August, 1931, and those interested should refer to those issues.

TUNING UP

Although any amateur can fire up a 'phone on 56 mc. or on the 1875- to 2000-ke. band as soon as he is ready, or on the 14,150- to 14,250-ke. band as soon as he qualifies for unlimited operation, *there can be no 'phones on the air between 3900 and 4000 kc. before 3:00 a.m., E.S.T., April 1st.* All tuning up and testing prior to that time must be done on a dummy antenna. All tuning up and testing should be done on a dummy antenna at any time, for that matter. Fig. 1, the one and lonely circuit diagram of this article, illustrates a suitable, cheap and quickly concocted arrangement that is used in our laboratory. The amplifier need not be push-pull and the antenna inductance need not be split. The idea is to connect the antenna tuning condenser in parallel with the antenna inductance and connect the dummy load across a few turns of the coil. The right number of turns, found quickly by experiment, will give maximum output, as shown by illumination of the electric light, at the proper plate input to the amplifier. The 50-watt bulb is about right for a pair of Type '10's, a 25-watt size is better for a single Type '10, a 100-watt for a Type '03-A or '52. Larger bulbs or several in parallel can be used for higher-powered amplifiers.

Strays

Louis Berkowitz, W1AVE, was awarded first prize in the letter contest recently held by the International Resistance Company. You just can't keep these hams from coming out on top!

The 841 tube is now marketed by the Radio-tron and Cunningham organizations, making the tube available through regular radio dealers. Formerly it could be obtained only from the RCA-Victor Company. The 841 is a high-mu tube of the "210" type, and is especially suitable for resistance-coupled voltage amplifiers where the grid swing to be handled is relatively large. Its characteristics are given in the July, 1929, issue of *QST*.

W5BAD enrolled at a Texas university last fall, but quit when they wouldn't let him put up a ham station at the school!

Eliminating Interference Caused by Electrical Equipment

By Absalon Larsen*

AS IS well known, in most cases the interference to radio reception from electrical apparatus and machinery is caused by small sparks produced by the make or break of an electric current, as in switching on or off a light; operating a telegraph key, or running a d.e. or a.c. commutator type motor. In some literature one often finds the remark that "electrical sparks produce oscillations which radiate into space and influence the receiver in the same manner as the radiation from a radio transmitter." This view is apt to be rather misleading. In reality the interference is generally the result of a *transient phenomenon*, not of regular oscillations. Moreover, the radiation chiefly follows the conductors, the direction of radiation at some distance from the source being parallel to the conductors. A practical illustration of this is shown in Fig. 1.

In the house "B" the reception was seriously damaged by the running of a motor branched on the electric main at a distance of 1800 feet, whereas in the house "A" at a distance of only 180 feet from the motor no interference was observed. The explanation is that the house "A" had no electric light installation, as was the case with house "B," and the interference was caused by an *irregular electromagnetic wave traveling along the line*. A part of this traveling wave entered the house "B" following the service line and in some way or other influenced the radio receiver. The traveling wave might have crossed the capacity between a service wire and the lead-in from the aerial, followed the inlet wire through the receiving apparatus to the earth connection and caused a *sudden charging of the condenser in the high-frequency circuit of the receiver*. This would create a damped oscillation, in the circuit, of the frequency to which the circuit happened to be tuned. After amplification and rectification the result for each wave train would be a sharp crack in the headphones or loudspeaker.

The electro-magnetic wave traveling along the line with the velocity of light may be of constant

current and potential, with an extremely steep wave front, as is generally assumed in practical calculations in high tension engineering. The wave, though still aperiodic, also may have some irregular form. In these two cases it is the very passing by of the wave front that influences the receiving apparatus, whatever the frequency to which the receiving apparatus may be tuned. It may happen that the wave is partially periodic and of a definite frequency, in which case, of course, the interference will have a markedly selective character. Condensers, even rather small ones, involve practically no obstacle to the propagation of the disturbing traveling wave.

The way to prevent the interference generally is to *flatten the wave front* of the disturbing wave. A steep wave front resulting from simply making contact between two wires of different potential may have an interval of only a few meters from the very first trace of a wave to the point

of full intensity. To avoid interference this interval must be considerably extended, reaching, for instance, a value of 5000 to 10,000 meters.

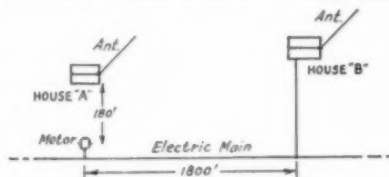


FIG. 1.—THE RADIATION FOLLOWS THE CONDUCTORS

Although much further from the offending motor, the receiver in house "B" was affected whereas there was no interference in house "A."

For this purpose a convenient arrangement of condensers or condensers and coils is used, a very important condition being that the condenser (or condensers) must be charged or discharged sufficiently slowly.

MOTORS

Fig. 2 represents an arrangement demonstrating the case of a small d.c. motor causing

* Royal Technical College, Copenhagen, Denmark.

disturbances in a radio receiver. The condensers C_1 , C_2 and C_3 are not present to begin with. Imagine a spark appearing between the brush "B" and

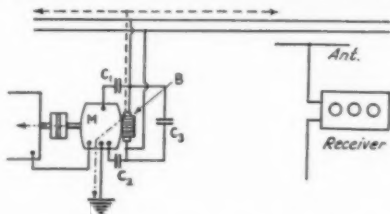


FIG. 2.—HOW A SMALL D.C. MOTOR CAUSES INTERFERENCE TO RADIO RECEPTION

The disturbance is eliminated by uniting the two charges of opposite sign by means of condensers. The same treatment would be applicable to d.c. generators.

the commutator. At the very moment of the appearance of the spark, two traveling waves of opposite sign start in opposite directions. One of these, which we may call positive, will pass on to the corresponding wire of the supply installation as shown by the dotted line in Fig. 2. The other wave, the negative, will enter the armature winding and part of it will cross the insulation, thus reaching the armature core, and another part will cross the air gap and reach the motor frame, from where it will continue its way following any conductor connected to the frame—for instance the earth lead, if there is one, as shown with the stippled line in Fig. 2. The part that reaches the armature core will partly cross the bearings and reach the motor frame; and partly it will reach the pulley or the clutch. One might think that a

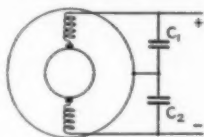
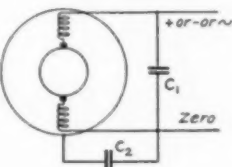


FIG. 3—CONDENSER CONNECTIONS FOR THREE-WIRE DISTRIBUTION SYSTEMS

FIG. 4—CONNECTIONS FOR TWO-WIRE SYSTEMS WITH ONE SIDE EARTHED



part of the negative wave would reach the other brush and from there follow the other supply wire. This part is, however, usually negligible. Sparks at the other brush will, of course, produce a couple of traveling waves, of which one will follow the opposite wire of the installation, whereas the other will follow a similar way to the motor frame, as in the previous case. The positive wave front passing by the small aerial will cause disturbance in the receiver. As proof of this, when the supply wire is removed from the vicinity of the aerial the disturbance ceases.

Generally the sum of positive electric charges leaving the motor with the positive wave will be equal to the sum of negative electric charges leaving the motor with the negative wave. Thus if the earth connection is removed the negative wave will be reflected, and it will carry only the quantity of electricity required for charging the motor as a whole to a certain potential. Therefore the positive wave will carry only a correspondingly small quantity of positive electricity. In the case of a small motor this small charge will not suffice to disturb the receiver seriously. As a demonstration of this, the noise at the loudspeaker ceases when the earth connection is interrupted. If one or two persons touch the motor frame, and thus add to the capacity, the noise will return. To eliminate the disturbances one must unite the two charges of opposite sign by means of condensers connected between each of the wires and the motor frame. To show this, if the earth connection is re-established a loud

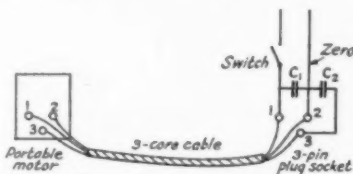


FIG. 5—A SUITABLE ARRANGEMENT FOR SMALL PORTABLE MOTORS

noise is heard from the loudspeaker. The noise completely disappears when the two condensers C_1 and C_2 are connected as shown in Fig. 2. It is shown also that the connection of the condenser C_3 alone scarcely diminishes the noise, whereas the noise completely disappears when C_3 and either C_1 or C_2 are connected.

In practice the connection of the condensers may have some undesirable consequences, especially in a.c. installations. In the first place the motor frame may have a potential difference from its surroundings (if it is not earthed), whereby persons may receive disagreeable electrical shocks. Secondly, if the frame is earthed, the current to earth through the condensers may give rise to low-frequency telephone disturbances. To avoid both inconveniences, the two connection diagrams in Figs. 3 and 4 may be used. When the motor is connected to the plus and minus conductors of a three-wire distribution system with earthed middle wire, the circuit of Fig. 3 must be used, the two condensers being of equal size. For the suppression of radio interference only, however, the condensers need not be equal at all.

When the motor is connected to a two-wire installation, one wire being the "zero" (earthed) conductor, the connection shown in Fig. 4 will do. One condenser is connected across the line from the outer conductor to the "zero" conductor, the other condenser being connected from the zero

conductor to the frame. (The capacitive connection from the outer conductor to the frame in this case includes the two condensers connected in series.) In case of portable motors this arrangement requires uninterchangeable plug and socket.

A suitable arrangement for small portable motors is shown in Fig. 5, where the two condensers are taken to be combined with the switch and plug socket, these parts forming a special apparatus attached to the wall. The connecting three-wire cable to a certain extent influences the result and therefore the length of the cable should not exceed about 18 feet. If the third wire connecting the frame "3" to the pin "3" is replaced by a metal conduit enclosing the wires "1" and "2", the connecting cable can be much longer. If an earth connection to the frame is provided,

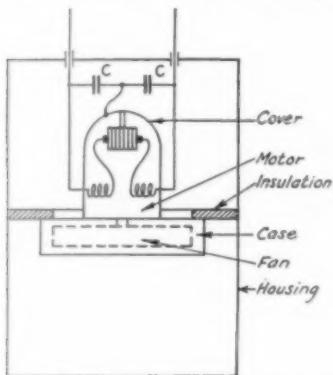


FIG. 6—THE EQUIPMENT FOR AN ELECTRICAL VACUUM CLEANER

the earth-connecting wire must be attached to "3" of the socket. If "zero" connection of the frame is specified, the condensers C_2 in Fig. 4 and Fig. 5 simply are replaced by connecting wires.

In Fig. 3 and Fig. 4 series windings are shown connected between the brushes and the line. This is done to emphasize that in this case the

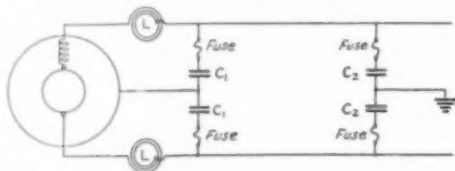


FIG. 7—AN EFFECTIVE ARRANGEMENT FOR MOTORS OF LARGER POWER

condensers shall not be connected directly to the brushes but to the outer terminals to which the supply wires are attached.

Since the chief point to be observed in preventing the radio disturbances is to unite the two opposite electric charges carried by the two waves, in certain cases it will be insufficient to connect condensers between the conductors and the motor

frame. If, for instance, the motor shaft is electrically connected to other metal parts outside the motor, either directly or through a clutch, it is

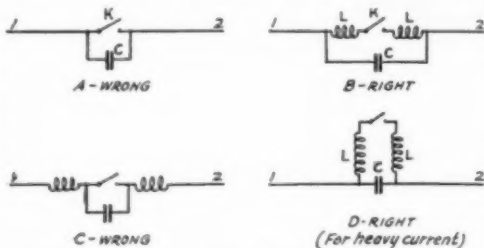


FIG. 8—RIGHT AND WRONG CONNECTIONS FOR KEY-CLICK AND SWITCH-CLICK ELIMINATION

The circuits b and d are patented in some countries.

necessary to connect such parts electrically to the motor frame and thereby to the condensers (Fig. 2). The electrical connection through the bearings of a running motor is usually quite inadequate for this purpose and represents a capacity combined with a great resistance rather than a short-circuit connection. If the motor frame does not totally enclose the armature and if foreign metal parts are present near the motor, it may happen that a fraction of the wave entering the armature does not reach the frame as was supposed in Fig. 2, but crosses the air gap and reaches these foreign metal parts outside the motor. In this case those metal parts also must be electrically connected to the frame and thereby to the condensers.

The equipment of an electrical vacuum cleaner, in which these points have been taken into consideration is shown in Fig. 6. In the first place the motor and all parts attached to it are insulated from the housing. Secondly, the fan case is electrically connected to the motor (but not to the housing), and the commutator end of the motor carries a metal cover connected to and attached to the motor frame; the frame, the fan case and the cover together forming a complete electrostatic enclosure containing the armature and fan. Then the radio disturbances will be completely prevented by means of the two condensers, C , connected between the supply wires and the metal enclosure. The cover may consist of metal netting of sufficiently fine mesh; and in the fan case there must be openings for the passage of the stream of air. The metal covering, therefore, must be shaped in such a manner that electrostatic lines of force issuing from the armature, the shaft, and the fan, are not allowed to penetrate the opening and reach the housing, but are picked up by the metal enclosure. (The openings may simply be covered by netting.) Since the housing is insulated from the motor there will be no possibility of any inconveniences in the way of personal danger or telephone interferences as mentioned above.

CONDENSER SIZES

To ensure a practically complete prevention of radio disturbances under all circumstances, it is advisable to provide condensers of $0.1 \mu\text{fd.}$ for all small motors. For larger motors, from 5 h.p. to about 20 h.p., condensers of $1 \mu\text{fd.}$ are recommended. For still larger motors condensers alone generally will not suffice, but high-frequency coils must be inserted in the conductors between

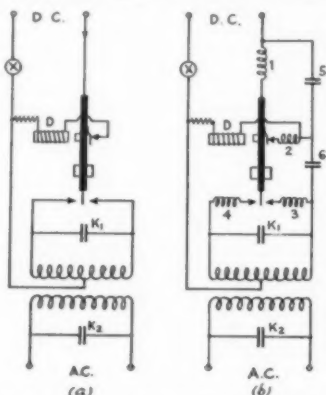


FIG. 9—HOW CHOKES AND CONDENSERS ARE UTILIZED TO ELIMINATE THE INTERFERENCE CAUSED BY A TELEPHONE RINGING MACHINE

The connections shown at b are patented in some countries.

the terminals and the point where the condenser connection branches off. Fig. 7 shows a practical arrangement. $L-L$ are the high-frequency coils and C_1-C_1 are condensers coupled to the frame, etc., of the motor. C_2-C_2 are condensers coupled to the conductors at a distance of 18 to 36 feet from the motor and connected to any appropriate metal body present, for instance an earth plate (if located near the ground) or to metal parts of the building.

KEY AND SWITCH CLICKS

In Fig. 8 is shown the simple case of a key K connecting two wires "1" and "2" of different potentials. The operation of the key will cause two waves of opposite sign to travel on to the two wires. (The wires are imagined very long.) A simple connection of a condenser C in parallel to the key, as shown in Fig. 8a, is an incorrect arrangement. The right connection is shown in Fig. 8b, where the high frequency coils $L-L$ are introduced into the main circuit and the condenser C is connected in parallel, not to the key alone, but to coils and key as a whole. In a great number of practical cases the connection of Fig. 8b will be extremely useful. In telephony and telegraphy a suitable value of the coils will be:

$$L=0.0001 \text{ henry and } C=0.1 \text{ microfarad.}^1$$

¹ Tests with this arrangement as the key-click filter on an amateur transmitter seem to indicate that larger inductance values are more effective, 0.1 henry (100 mh.) for example.
— EDITOR.

The arrangement of Fig. 8c is much less effective than the one of Fig. 8b. To attain the same result with the circuit of Fig. 8c, the self-inductance of the coils must be many times greater than in the arrangement of Fig. 8b; for instance, 100 to 300 times greater.

In the circuits for heavy current the self-inductance of the coils L , Fig. 8b, may be chosen smaller and the capacity of the condenser C greater, the product remaining the same. Further, the conductors "1" and "2" must be connected more directly to the condenser terminals to avoid the fall of potential in the connecting wires to the condenser, as shown in Fig. 8d.

An application of the principle in a more complicated case is shown in Figs. 9a and 9b. Fig. 9a gives the diagram of connections of the so-called "alternator" (ringing machine), an apparatus transforming direct current as supplied from service mains into alternating current (of about 16.6 periods per sec.) to be used for calling purposes in telephone exchanges. This apparatus is the cause of serious radio interference. In Fig. 9b is shown the addition of the high-frequency coils "1," "2," "3," and "4" and the condensers "5" and "6," which together with the condenser K that is already present, successfully eliminate the disturbances from this source. The principle of the connection is as follows: In all conductors leading to the contact pieces coils are inserted as near as possible to the contact-piece; and the outer terminals of the coils are interconnected by means of condensers.

A GENERAL METHOD FOR LOW-TENSION APPARATUS

A general method applicable in all cases where difficulties have arisen is shown in Fig. 10. The apparatus that causes radio disturbances is sur-

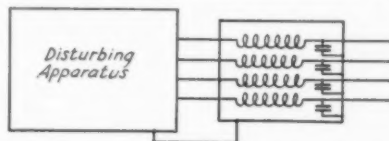


FIG. 10—ILLUSTRATING THE GENERAL METHOD APPLICABLE TO LOW-TENSION APPARATUS

This is patented in some countries.

rounded by a complete metal shield, high-frequency coils are inserted in all conductors passing to and from the apparatus, and condensers are connected between points of the conductors outside the coils and the metal shield. In Fig. 10 the coils and condensers are supposed to be combined, forming a special apparatus that can be added to a disturbing apparatus already present. The metal shield should not fit too closely around the disturbing apparatus.

As the insertion of condensers generally involves the creation of oscillation, care must be taken to prevent electromagnetic induction be-

(Continued on page 23)

Silvering Electrodes on Quartz Crystals

By George S. Parsons*

IN CONNECTION with certain research work in the Department of Chemistry of the University of California, involving the use of crystal-controlled oscillators, it occurred to the writer that the application of a silver surface to the quartz crystal might prove useful. The crystal was "thin" cut, having a frequency of about 3500 kc. After polishing with No. 600 carborundum, it was washed with carbon-tetrachloride and silvered by the Brashear process, which will be described in detail later. The edges of the crystal were then polished with fine carborundum in order to prevent contact between the two opposite silvered faces. The results proved to be all that could be expected. The crystal, when placed in a conventional crystal holder consisting of two polished brass plates, oscillated freely, giving quite as much power output as was obtained from the same crystal and holder before silvering. The crystal was then removed from the holder and connected in the circuit by means of two small wires pressing lightly against the silvered surfaces of the crystal. In this case the crystal oscillated even more freely and gave a considerably larger power output than could be obtained from a crystal when used in a conventional holder. For this reason the writer believes the process to be well worth the trouble involved in applying the silver surface.

It is probable that the higher power output is due in part to the excellent contact between the metal surface and the crystal, and in part to the fact that the silver surfaces are very thin and light. Consequently the crystal is obliged to do but very little mechanical work in vibrating, certainly much less than when used in a holder with comparatively heavy brass plates.

The method of applying the silver is as follows: The crystal is washed with carbon-tetrachloride to free it from grease and dirt. It is then placed in distilled water until the silvering solutions are ready for use. The silvering solutions, two in number, are made up as follows: Dissolve 1 gram of silver nitrate in 150 cc. of distilled water and a dilute solution of ammonia, until the brown precipitate which forms is nearly, but not quite, dissolved. To this solution add 0.5 gram of potassium hydroxide which has been dissolved in 25 cc. of water. The solution will turn dark brown in color and ammonia again must be added until this second precipitate is nearly dissolved. The solution must *not* be clear, as it will become if too much ammonia solution is added. In case, by accident, too much ammonia solution is added,

the trace of brown color can be restored by adding a little silver nitrate solution. The crystal is now placed on edge in a clean beaker, with one rim of the crystal leaning against a wall of the beaker. This will enable the solution to come in contact with both sides of the crystal, which is quite important. The above solution is now poured into the beaker, care being taken to prevent the crystal from falling flat in the beaker.

Reducing solution: Dissolve 8 grams of cane sugar in 70 cc. of distilled water; add 18 cc. of ethyl alcohol and 0.3 cc. of concentrated nitric acid dissolved in 15 cc. of distilled water. This solution should be allowed to stand for at least a week before using. To the solution in which the crystal is placed, prepared as described previously, add about 15 cc. of the reducing solution and permit the mixture to stand for a few minutes, until a brownish grey film collects on the surface of the solution. The liquid may then be poured off and the crystal washed and dried.

NOTE. — A relatively simple silvering formula with which we have had excellent success follows:

Dissolve $\frac{1}{8}$ oz. (4.7 gm.) of silver nitrate in 1 pint of distilled water. Put one quarter of this solution to one side and treat the remainder by adding concentrated ammonia (with an eye-dropper). The solution will turn dark at first but will eventually clear to a light straw color. At this point add the reserve one-fourth of the original solution. For the reducing solution, boil $\frac{1}{20}$ oz. (1.4 gm.) Rochelle salt in 1 pint of distilled water for a minute or so, then add slowly $\frac{1}{20}$ oz. (1.4 gm.) silver nitrate. Boil again for 2 minutes. After standing ten hours or more, both solutions should be filtered. Equal quantities of the solutions are poured together immediately prior to immersion of the object to be silvered. Before silvering, a vigorous swabbing of the crystal with nitric acid, followed by a very thorough washing in pure water, is suggested. — EDITOR.

Strays

A newspaper clipping sent in by W9BXT reports one of the rather rare cases of electrocution from a 110-volt circuit. The victim apparently had been making repairs to an extension cord with damp hands, and an accidental shock was enough to cause death. Although no serious effects will be felt by the average person from 110-volt shocks, it *does* pay to use reasonable care in handling such circuits.

* 2717 Derby St., Berkeley, Calif.

'Phone Operator's Examination Ready

Department of Commerce Arranges to Certify Operators for "Unlimited" Amateur 'Phone Operation

By K. B. Warner, Secretary, A.R.R.L.

TRUE to our prediction of last month, the Radio Division of the Department of Commerce has announced the procedure for the qualifying of operators for "unlimited" amateur 'phone operation after April 1st. They will examine and certify operators for this purpose beginning February 1st.

It won't hurt a bit to review here what this is all about. Until 3 o'clock a.m., E.S.T., April 1st, the 'phone bands in this country open to every licensed amateur are as follows:

1,715 to 2,000 kilocycles
3,500 to 3,550 "
56,000 to 60,000 "

In addition to this, amateurs who show special technical qualifications are currently permitted to operate 'phone between 14,100 and 14,300 kc. Effective 3 o'clock a.m., E.S.T., April 1st, the 'phone bands are changed and are divided into two classes, one class open to every licensed amateur and the other open only to operators who have specially qualified. The bands open to every amateur are:

1,875 to 2,000 kilocycles
56,000 to 60,000 "

In addition to these bands, stations operated by a person who holds an operator's license of a grade approved by the Secretary of Commerce for unlimited amateur radiotelephone operation may use the following bands:

3,900 to 4,000 kilocycles
14,150 to 14,250 "

The Department of Commerce now announces a special examination for operators and states that the Supervisors will put an appropriate endorsement upon the operator's license of all persons who pass it or who otherwise qualify — and details of the latter business are also announced. We quote their letter of instructions to the Supervisors:

DEPARTMENT OF COMMERCE
RADIO DIVISION
WASHINGTON

January 14, 1932

All Supervisors of Radio:

Your attention is directed to the amended amateur regulations, particularly the regulations relative to the operation of radiotelephony under paragraphs 376 and 377 of the Federal Radio Commission's rules and regulations which provide that the station shall be operated by a person who holds an operator's license of the grade approved by the Secretary of Commerce for unlimited amateur radiotelephone operation.

In order that the representatives of the Secretary of Commerce in the field may ascertain whether an applicant for the privilege of unlimited 'phone operation is qualified for such privilege, a special examination will be given.

To be held eligible for this examination, an applicant must have the following qualifications:

- (a) Have had at least twelve months' operating experience under any class of operator's license, excepting radiotelephone operator's license.
- (b) Applicants holding unlimited broadcast operator's license may be given this privilege without examination because of their having passed a similar examination to receive their present license.
- (c) Holders of broadcast limited licenses may be given this privilege after having passed the regular amateur code test.
- (d) Operators who have qualified under previous regulations to operate in the 20-meter 'phone band may also be given this privilege without examination.
- (e) In the case of amateurs operating under a temporary amateur operator's license, evidence must be submitted that they have operated amateur stations for a period of at least one year.

The following phrase will be typed on the face of the operator's license after he has passed the examination or qualified as indicated above:

"The holder of this license examined and certified for unlimited amateur radiotelephone operation under Federal Radio Commission Regulation No. 377.

Date

Examining Officer"

Applicants for unlimited phone operation residing at remote points may be given this examination by mail, but only after the applicant has submitted conclusive proof that he has operated a radio station for a period of at least one year.

This supplemental examination may be given at any time after February 1, 1932, in order that all of those desiring to be qualified for unlimited phone operation may be prepared for this privilege when the Federal Radio Commission's regulation becomes effective, April 1, 1932.

There will be submitted to you under separate cover a supply of questions to be used in this examination.

W. D. TERRELL

Director of Radio

WHAT TO DO

If you are eligible and want to operate 'phone in the "eighty- and twenty-meter" bands after April 1st, communicate at once with your Supervisor of Radio and ask to be given the special examination (or, if you are already qualified, to receive the special endorsement upon your license). If your location is distant from his office, you'll probably get the examination by mail; if you are within reasonable distance, you'll have to appear in person. You must get the new authority before April 1st, or thereafter confine your 'phone operation to the 1875-kc. and 56-mc. bands.

Regarding subparagraphs (b) and (c) of the

(Continued on page 86)

An Effective Power-Type Frequency Multiplier

By H. S. Keen, W2CTK*

CRYSTAL-CONTROLLED transmission for the higher frequency amateur bands is made possible by following a relatively low-frequency crystal oscillator with a system of frequency multipliers that excite the final amplifier. Because of the harmonic relationship of the ham bands, the multiplier usually consists of one or more doublers, depending upon the re-

excited at a given frequency, while the plate tank is tuned to some harmonic multiple thereof, usually the second or third. Attempts to quadruple the frequency in a single stage are, as a rule, not entirely successful, because the greatly diminished amplitude of the higher order harmonics. The primary object in frequency multiplication is distortion of the wave form.

In practice this is accomplished by adjustment of the grid bias. In a fairly high-*C* tank the circulating current is nearly sinusoidal in wave form, although the plate current of the tube is quite irregular.

When using a low-*C* tank this wave form is not "ironed out" to the same degree as by a high-*C* tank and, consequently, the harmonics present in the output are more pronounced. Thus we see that the tank circuits of frequency multipliers should be low-*C*.

One scheme of frequency quadrupling (for which I am indebted to W1RW) filters the second harmonic out of the very irregular oscillator plate

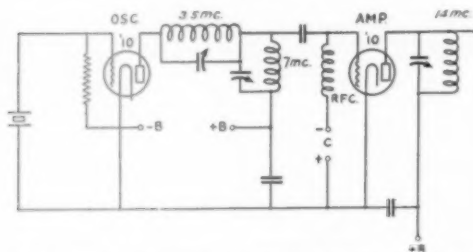


FIG. 1.—DOUBLING IN THE PLATE CIRCUIT OF THE OSCILLATOR

spective frequencies of the crystal oscillator and output amplifier. An "odd" crystal that permits tripling to the desired band is sometimes used, on the 14-mc. band in particular, to reduce the number of multiplier stages required. This has the disadvantage that the crystal is useless on the lower frequency bands, hence the widespread use of the doubler. In our own case a quadrupler was desired to

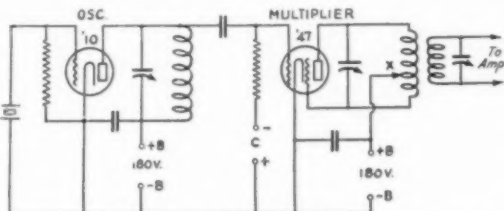


FIG. 3.—A PENTODE FREQUENCY MULTIPLIER WITH BOTH PLATE AND ACCELERATOR GRID CONNECTED TO THE TANK CIRCUIT

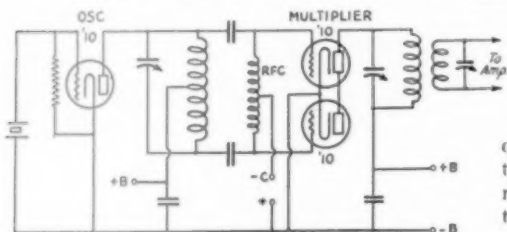


FIG. 2.—A MORE EFFICIENT DOUBLING ARRANGEMENT

The grids of the doubler tubes are in series, across the oscillator output circuit, and the plates are in parallel.

control a 14-mc. 'phone and, if possible, to supply enough "kick" to excite the Class C amplifier directly, using a 3.5-mc. crystal.

In the usual frequency multiplier the grid is

* 1330 E. 28th St., Brooklyn, N. Y.

A POWER DOUBLER

As an effort to quadruple directly, the circuit of Fig. 2 was set up. This circuit is inherently a doubler. The odd harmonics, including the fundamental, are largely eliminated, the output

being mostly of the second harmonic frequency. This method of doubling is not entirely dependent upon distortion of the wave form. It is evident from an examination of the circuit that each tube handles one alternate cycle of the output, the efficiency being better than that obtainable in the usual doubler, particularly with triode tubes. It seems that for the chap using a couple of Type '10 tubes, one as a doubler and one as an output tube, this circuit offers an alternative

well known Hartley circuit, with the accelerator grid replacing the control grid. No tendency of this circuit to self-oscillation was observed during any of the tests. The r.f. voltage obtainable at the plate was considerably increased by moving the tap "X" from the accelerator-grid end several turns toward the plate end of the coil. The greatest improvement was obtained when the portion of the coil tapped off for the screen grid was from one fourth to one third of the entire coil. The adjustment was not very critical.

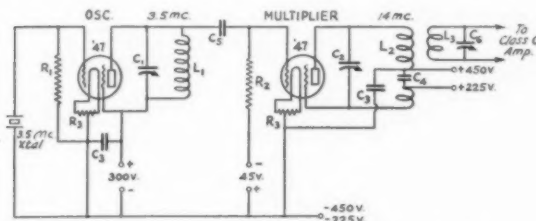


FIG. 4.—THE CIRCUIT IN ITS FINAL FORM. PENTODES ARE USED FOR BOTH OSCILLATOR AND DOUBLER STAGES

- L₁ — 30 turns No. 22 d.c.c. on 1 1/4-inch diameter bakelite former. No spacing between turns.
- L₂ — Wound on 1 1/4-inch diameter bakelite former. Plate section, 10 turns No. 16 enameled wire spaced slightly more than diameter of wire; s.g. section, 4 turns wound in same fashion. Spacing between coils same as spacing between turns.
- L₃ — 14 turns, similar to L₂.
- C₁ — 50-μfd. midjet variable condenser.
- C₂ — 50-μfd. variable.
- C₃ — 0.01-μfd. mica type by-pass condensers.
- C₄ — 0.002-μfd. mica type.
- C₅ — 200-μfd. mica type.
- C₆ — 50-μfd. variable.
- R₁ — 100,000-ohm 3-watt resistor.
- R₂ — 50,000-ohm 3-watt resistor.
- R₃ — 20-ohm filament center-tap resistors.

scheme which would eliminate one tank circuit as well as the need of any neutralizing. Each tube acts as the neutralizing capacity for the other. When the attempt to quadruple the original frequency was made the circuit began to "act up" and perform erratically, probably because of some r.f. wandering around where it didn't belong. Therefore it was shelved as a quadrupler prospect until the opportunity presented itself to give it an overhauling and make it behave.

The '47 pentode, with an extra grid or two handicap over the triode, was the next consideration. A scheme resembling the electron-coupled oscillator of a recent issue of *QST*¹ was tried,¹ the fundamental-frequency tank being put in the screen grid lead and a second harmonic tank in the plate lead. The results were rather disappointing, and the arrangement was discarded.

It appeared that the screen grid instead of being maintained at ground (r.f.) potential could be incorporated actively in the circuit. To test this scheme the circuit of Fig. 3 was set up. It can be seen that the plate tank resembles the

The '47 pentode thus shows itself to be not only an excellent crystal oscillator tube, but also probably the best of the low power tubes as a frequency multiplier.

Strays

W2ADG, who has never even listened in on 20, much less operated a transmitter there, has nevertheless received QSL cards from four continents acknowledging QSO's on that band. Now he wants to know if the guy who is using his call won't please work an Asian — so he can apply for a WAC!

— W2TY

Eliminating Interference Caused by Electrical Equipment

(Continued from page 19)

tween the circuits and the condenser connections. Thus in Fig. 10 the wire connecting the two metal shields must be short and must be kept at a certain distance from the other conductors; or it must consist of a metal conduit containing the other conductors, in which case it may be made longer.

¹ Dow, "Electron-Coupled Oscillator Circuits," *QST*, Jan. 1932.

A Change in A.R.R.L. QSL-Card Service

Heavy Increase in Foreign Listeners' Cards Makes Necessary Policy of Forwarding Only QSO Cards, Effective April 15th

By A. L. Budlong, Assistant Secretary, A.R.R.L.

THE man who coined the phrase regarding little acorns doing their stuff and becoming great oaks couldn't have known of the growth of the A.R.R.L. QSL-card forwarding service, or he would have added a fervent "— and how!"

The acorn, in this instance, made its appearance in early 1924, just after international ham radio became an actuality, and manifested itself in the form of the first letter of its kind ever received at Headquarters. The letter enclosed a QSL card bearing the call of a foreign ham, explained that the writer had no way of obtaining the address (there were no international callbooks and many foreign amateurs were reluctant about sending their addresses over the air) and asked if we could forward the card. We could and did; before the year was up perhaps several hundred such cards had been handled. So much for the acorn.

Now for the oak: Last year, the League's card-forwarding service handled upwards of 50,000 cards, at an estimated cost for labor and postage (which is paid by the League 95% of the time) of some \$2000! Our normal card-forwarding personnel had to be augmented by overtime on the part of several other girls, and eventually required the hiring of still an additional full-time girl for this work alone. And the prospect for this year is even worse; in fact, gang, it's sufficiently serious to necessitate consideration of a change of some sort in our forwarding service if we are to avoid not only taking the goose for a ride but busting the golden egg in the bargain. In other words, card forwarding has now reached the stage where it is practically hopeless for headquarters to cope with it with our existing facilities. We must do something to reduce the load and we believe the decision to forward only cards relating to actual QSO's will do it without impairing the service for which the department was really created.

In going over the situation, one of the first things we discovered was that the nature of the

service has changed in many respects. For instance, it originally was devoted primarily to forwarding American cards to foreigners. To-day it is just the reverse; foreign cards destined for United States and Canadian hams make up 95% of the traffic. These cards are shipped to us in bulk from foreign countries at low rates of postage and necessitate the application of American postage before they can go further

— which explains the statement that the League pays the final postage on most of the cards handled. However, we are not contemplating any changes here, since its just as much a service to our American hams to forward cards to them as from them and since no workable arrangement has been devised to collect postage from the foreign senders.¹

There's another big difference in the character of the service, too. It was started for the purpose of forwarding cards in cases where the address was unknown; we practically never received cards if the call was listed in current callbooks. And when you stop to think of it, that really is the principal

reason for the existence of a forwarding bureau. But alas for theory! To-day, 98% of the cards which come to us are for stations whose addresses are listed in any one of several callbooks. In fact, there is evidence that some of the card senders possess such callbooks, since quite a few hundred of the cards we handled last year had the full addresses written out for our convenience so that all we had to do here was to attach the necessary postage¹ and drop them in the mailbox. Under such circumstances, it was natural that one of the suggestions we considered for reducing the load would be to make a rule that cards could not be forwarded where the calls are listed in a callbook. But for various reasons we abandoned that idea, too, and for the

¹ In connection with forwarding postage, we acknowledge with appreciation the habit of most American hams in enclosing necessary stamps for forwarding (which should not be attached to the cards, by the way) and for those others who voluntarily reimburse the A.R.R.L. at times for postage on foreign cards forwarded to them by the League.

Eight years ago the League's QSL-card forwarding bureau was inaugurated as a service to amateurs who wished to exchange a card with some station they had worked but whose address was unavailable. To-day the League receives tens of thousands of cards annually, the number increasing at so rapid a rate during the past year as to impose a severe load on the Headquarters facilities, necessitating the hiring of additional help for this work alone. In an effort to ease what is becoming a painful burden the League has decided that beginning April 15th it must decline to forward so-called listeners' cards (which are mainly responsible for the increase and now constitute 50% of all cards received) and will forward only cards relating to actual QSO's. It is hoped that this step, plus the cooperation of all amateurs in forwarding cards direct whenever possible, will make it unnecessary to inaugurate any further changes.

—EDITOR

time being, at least, will continue to forward cards regardless of whether or not the calls are listed.

The third point of difference, and the one in which we are reluctantly compelled to establish a new policy, concerns the nature of the cards. Where most of the cards used to have reference to actual contacts, some 25,000 cards last year (approximately 50% of the total) were "listener" cards, not bearing on actual two-way work, but merely reporting the interception of the signals of the amateur to whom the card was addressed. Most of these were from foreign listeners. As most American hams are aware, it is not so easy for amateurs in many other countries to operate transmitters, either for legislative or economic reasons, or both. The result has been the growth of many hundreds of "short-wave receiving stations" whose operators nightly comb the air for DX. Unfortunately for our QSL bureau, however, they also nightly address cards by the thousand reporting such "calls heard," and it is this type of card which is badly clogging up our whole QSL system. Much as we regret the necessity for doing it, we feel that in putting some change into effect — and we simply must do something if we are to continue a QSL bureau at all — we should start here. Consequently, beginning April 15th the A.R.R.L. must decline to handle such cards.

We embrace the fond hope that most thinking hams will approve this decision. Bear in mind that this will not make it impossible for foreign listeners to send cards to U. S. and Canadian amateurs. Were this so, we would have to consider something else as a means for relief, for we appreciate and value the hard work of these listeners in reporting American signals. But as we have already said, the call of practically every U. S. and Canadian amateur for whom we have been getting these "listener" cards is listed in the callbook² and our listening friends abroad need only purchase a callbook in order to have instant access to the addresses of 99% of the stations they log. And doesn't it seem reasonable that if a listener is seriously interested in his work of sending cards, he would be willing to buy a callbook and address his own cards?³ We think so.

In closing this squib, some incidents in the daily grind of the QSL department may be of interest. One is that our bureau always gets heavily overloaded after each international contest; frequently we receive as high as 1500 cards

a day. We're getting so we positively dread each contest announcement that emanates from the Communications Department! Then there are the foreign hams who send us cards that are intended for other foreigners (we get dozens of them) and we can recall at least one ham abroad who sent us a card to be forwarded to a station in his own country! Many foreign amateurs who have had an exchange of cards with some American ham, and are thus in possession of his name and address, nevertheless continue to use the QSL bureau for the exchange of additional letters, postcards, photographs, etc., with the station in question. Nor must we forget the American ham who wrote in one day sending us a batch of cards representing his QSO's over a period of six months, naively explaining that he was unable to afford the postage but trusting that, inasmuch as he was a member of the League, we would buy the necessary postage for him. We computed the postage bill and found it came to nearly \$3, which strikes us as a pretty darned good return on a \$2.50 membership investment, considering that our friend got *QST* for a year, in addition. Needless to say, we could not establish any such precedent as this, and therefore had to decline.

The crowning incident, however, occurred last fall when we received more than 1000 cards in one batch from a single foreign ham with the request that we put on the necessary postage and addresses and forward them. The cards started in at W1AAA and proceeded alphabetically from there on. Not one related to a QSO. For that matter, examination showed that not one of them even reported hearing the signals of the ham to whom the card was addressed. The sender simply wanted to exchange QSL cards with American amateurs; he promised us another couple of thousand as soon as he could get them addressed — he'd only got as far as the first district with the initial batch! Well! When the two girls in our QSL department got that batch they fainted dead away for twenty minutes, which not only was rough on the girls but delayed our card forwarding to the extent of some dozens of cards. It is only fair to add that the ham in question was extremely nice about it later and eventually recalled the cards, but it just goes to show what this QSL forwarding business may lead to.

Strays

Ever hear the one about the would-be ham taking the exam, how, when asked by the R. I. what is meant by emitting harmonics, replied that we shouldn't use profane language over the air and should work in harmony with each other?

— W6KX

² *Radio Amateur Call Book Magazine*, price \$1.00 (\$1.25 foreign) may be obtained from the publishers at 608 S. Dearborn St., Chicago, Illinois, U. S. A., and contains calls of United States, Canadian, and most foreign amateurs. *Amateur Radio Stations of the United States*, a list of United States amateurs only, can be obtained from the Government Printing Office, Washington, D. C., for 35 cents (coin or money order only).

³ The business of buying and using a callbook is an equally swell idea for the transmitting amateur, too!

The First Filter Choke—Its Effect on Regulation and Smoothing

By F. S. Dellenbaugh, Jr., and R. S. Quimby*

A POORLY smoothed power supply sounds like a sawmill. The analogy goes further as well. The first cut in a sawmill rips off the slabs and roughs out the log to its final shape. Further finishing operations each take a smaller and smaller slice. Ultimately the mahogany log of Honduras may become the highly polished piano or radio console. In the same way the first filter section roughs off the rectified a.c. and does the biggest job of trimming down the ripple to suit the exigencies of the associated apparatus. It seldom requires polishing down as far as furniture, but added filter sections, like added woodworking operations, can be made to reduce ripple to almost any desired degree. As a result of this somewhat violent hacking off of ripple, it is found that the first choke of the usual type of filter used with Type '66 rectifiers has a very high a.c. potential across its terminals. "Very high" is used in the sense that this voltage may amount to about half the output voltage, while succeeding sections usually operate with a very low percentage of output voltage appearing as a.c. across the choke terminals.

For example, in the circuit shown in Fig. 1, operating at 1200 to 1400 volts d.c. across the load, the a.c. voltage across the first choke (from terminal to terminal of the choke winding itself) ran from 700 to 760 volts a.c., r.m.s. value. This voltage rises gradually as the load is increased, but in general may be assumed as about half the terminal voltage without serious error.

The inductance of a choke, for a given amount of d.c. polarizing current, is materially increased if the a.c. flux component is increased. (Provided that the sum of the d.c. and a.c. fluxes does not saturate the core.) This fact can be taken advantage of in the design of the first choke, resulting in economy of material, improved smoothing and, best of all, much improved regulation. It was shown in a previous article in *QST*¹ that the first choke has a critical value. If the inductance is greater than this critical value the output voltage becomes the average voltage of the rectifier output, "soaring" at low loads is avoided and the peak current in the '66 tubes is held to a

minimum. Therefore let us set down the criteria for a first choke and see how near we can come to the ideal by special design.

1. The first choke will control regulation. For this purpose it must always have an inductance greater than the critical value; that is, very close to the load resistance in ohms divided by 1000, the quotient being henrys.

2. The first choke will control peak current in the rectifier. For this purpose maximum output allowable will be obtained when the choke has twice the critical inductance. This value will be referred to as the "optimum inductance."

3. The first choke will contribute to smoothing. For this purpose it must not introduce harmonics or instability, and must not resonate with the first condenser.

4. The first choke must adjust itself automatically to all loads. The desirable range will be from the "optimum value" at maximum current (minimum load resistance) to the "critical value" at minimum current (maximum load resistance).

CHOKE DESIGN

For discussion let us consider the circuit shown in Fig. 1, supposedly delivering 1000 volts d.c. to a resistance load. Regulation will be neglected for the present. A maximum current of 500 ma. will be considered as a safe overload limit, above the largest desired output. The minimum current will be taken as 50 ma., being either the bleeder current on a keyed circuit or the least probable current with a 'phone circuit. The range of the load resistance, therefore, will be 2000 to 20,000 ohms. Dividing these values by 1000, the limits of critical inductance are seen to be 2 and 20 henrys. But at the maximum load we want to be sure to reduce current peaks in the '66 tube, so here we must use the optimum value or 4 henrys.

Fig. 2 shows the limiting values of inductance below which we must not trespass for good operation. The critical inductance is drawn from 2 to 20 henrys as a straight line directly proportional to resistance and inversely proportional to current. The optimum inductance is placed at 4 henrys at 500-ma. load, twice the critical value. At the minimum load of 50 ma. the desired inductance can be the critical value; but we want a little leeway to be on the safe side, so 25 henrys is

This article is a continuation of the authors' discussion of high voltage filters that began in February *QST*, that article being essential to the proper understanding of the one herewith. The next of the series will appear in an early issue. — EDITOR.

* President and Engineer, respectively, Delta Mfg. Co., Cambridge, Mass.

¹ Dellenbaugh and Quimby, *QST*, February, 1932.

arbitrarily picked as giving 25% more than the least allowable. The upper straight line is then drawn from 4 to 25 henrys, representing the practical threshold above which the choke should operate. The optimum value is only required at the maximum load, for as the load falls off in current—even though the ratio of peak to

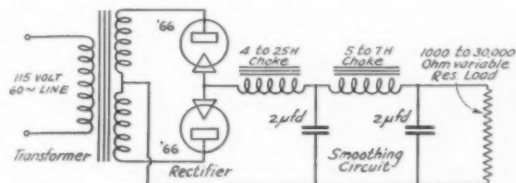


FIG. 1 — CIRCUIT DIAGRAM OF ARRANGEMENT USED FOR TESTS

average current increases in the rectifier—the actual peak will not rise above the full load value.

It is well known that increased d.c. will reduce the inductance and that proper air gap will control such reduction in any given choke. Increased a.c. ripple through a choke will, as already mentioned, increase the inductance. The problem of design in the first choke is, then, to apportion the

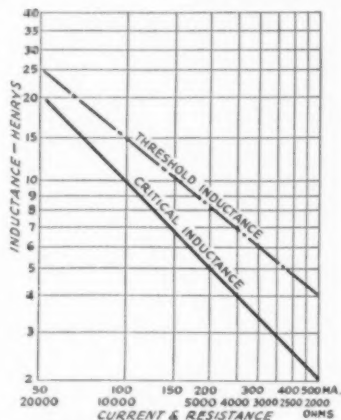


FIG. 2 — CRITICAL AND THRESHOLD VALUES OF INDUCTANCE

Output voltage about 1000, current range 50 to 500 ma.

various parts so that the inductance will swing through the desired range. The air gap must be adjusted to the d.c. polarizing force so that the inductance will neither be almost lost at high currents nor flattened out to such an extent that inadequate inductance will result at very low currents.

Fig. 3 shows the behavior of a satisfactory first choke with different air gaps. The dotted curves represent the inductance values tested with a special bridge, the d.c. being as given at the bottom of the curve and the a.c. component being contributed by 1 volt a.c. across the choke. The

inductance is measured in terms of the very small current resulting from this 1 volt a.c. impressed, and the resulting inductance values represent the minimum that will be obtained under almost any conditions. It will be noted that each curve touches the sloping straight line at a definite point. This point of contact, or tangency, represents the proper air gap setting for the maximum inductance that can be obtained with the particular core, winding, a.c. and d.c. for which the curve is drawn. From this it is evident that the curve for an air gap of 0.02 inch will give 4 henrys at 500 ma., but will only rise to a value of about 10 henrys at 50 ma. This is the point where we begin to give thanks for the large a.c. voltage across the first choke, and before going any further this effect upon choke behavior must be considered.

First look at Fig. 4. Here the increase of inductance above the 1-volt value is shown. The a.c. voltage is about 600 to 700, the inductance having been measured in an actual circuit similar to Fig. 1 by means of a lot of trick blocking chokes and by-pass condensers. Therefore the accuracy of the results cannot be guaranteed, but the general trend is close to actual facts. It will be seen that the percentage increase of inductance is greatest at low values of d.c. and falls off as the d.c. increases. This tends to increase the range through which the choke will operate. Referring back to Fig. 3 this can be represented by drawing straight lines parallel to the first solid heavy one, as shown by dashed lines marked "500 volts" and "1000 volts." These will be more or less parallel to the original line obtained from the bridge tests, and the dotted-line curves of inductance will rise towards these upper lines as the impressed a.c. voltage approaches corresponding values. They will, however, rise more at the low current end than at the high current end, as indicated by Fig. 4.

Taking the inductance curve for 0.01-inch gap (Fig. 3) and raising the inductance by the percentages of Fig. 4, the high current end rises almost to 4 henrys, while the low current end rises to 25 henrys. Therefore it looks as though this choke with a gap of about 0.01 inch would perform just about as we want it to in an actual circuit. The next thing is to try it and see what happens.

COMPLETE CIRCUIT BEHAVIOR

The choke discussed above is now placed in the circuit of Fig. 1 and the first choke and the gap adjusted until the desired results are obtained. Fig. 5 shows the inductance relations that actually occurred. The current and corresponding resistance values are shown at the bottom of the curve. The two lines of critical and threshold values of inductance are repeated from Fig. 2 for reference. The actual first choke inductance is

shown by the solid heavy line. The best air gap was found by trial to be 0.012 inch. This being a little bigger than the value of 0.01 inch discussed above, it resulted in the inductance being a little higher than anticipated at full load and a little lower at light load; but the criterion of maintaining optimum inductance at full load and not less than critical inductance at minimum load was satisfied.

The effect of other air gaps markedly different from the best one is interesting. If the gap is made much larger, the inductance flattens out and is represented by the curve marked "Large Air Gap" in Fig. 5. With this setting the inductance crosses the line of critical inductance at about 160 ma., at the point marked "C." Above this value the regulation will be satisfactory, but for smaller currents the voltage will begin to "soar." This same inductance crosses the threshold inductance at a little more than 300 ma. and so protects the '66 tube by reducing peak current at higher currents. Thus such a choke would be satisfactory on a few counts, but not all.

If the gap is too small very violent instability may occur at some particular current range. The inductance curve of Fig. 5 marked "Very Small Gap" saturates and tends to cross and recross the line of critical inductance at the points "A" and "B." As this point is reached when increasing the load current slowly, the choke inductance

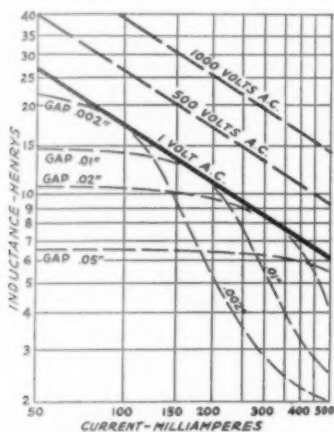


FIG. 3—VARIATION OF CHOKE INDUCTANCE WITH CURRENT AND AIR GAP

Heavy line is maximum inductance possible for given current for fixed air gap. Straight dashed lines show effect of increasing a.c.

drops below critical value, the output voltage begins to soar and, consequently, the current begins to increase. This increase in current pushes the inductance still lower, with consequent further voltage rise. At a higher current the inductance again becomes greater than the critical; the output voltage finds itself up in the

air, too high for the instantaneous conditions, and it collapses, the whole cycle repeating rapidly over and over. The results are very startling. Everything hums violently, the load concentrates almost entirely in one rectifier tube, the voltage across the choke rises to a higher value than

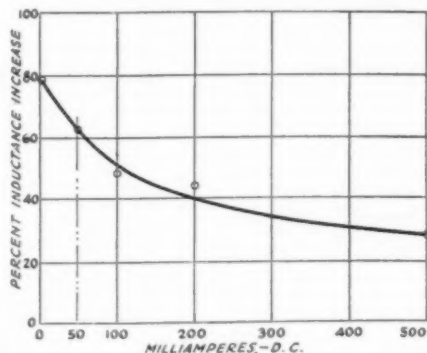


FIG. 4—PERCENTAGE INCREASE OF INDUCTANCE FOR HIGH VALUES OF IMPRESSED A.C.

The a.c. voltage was approximately the same as encountered in actual circuit operation. The reference inductance is that obtained by bridge methods with rated d.c. and 1-volt 60-cycle a.c.

almost any other voltage in the circuit. Increasing the air gap seems always to cure the instability. Apparently when such conditions exist the magnetic cycle followed by the choke core deviates materially from normal, a definition of its inductance under the circumstances seeming to be impossible. This horrible behavior is mentioned as a warning against too small gaps. But with the correct characteristics shown in Fig. 5 the results are entirely normal, stable and very advantageous. With a keyed circuit this instability is not encountered if the two currents, with key closed and open, lie outside the unstable range. For 'phone operation the circuit should be tested carefully for such instability to avoid its occurrence when actually on the air.

ACTUAL REGULATION

The proof of the pudding is in the eating. This discussion so far has attempted to build up the reason why and the designs showing how good regulation may be obtained. Fig. 6 shows the overall regulation actually obtained. The circuit of Fig. 1 was used, the first choke being the one described above and the condensers each 2 μ fd. The second choke was relatively small, although it gave adequate smoothing, varying from about 5 henrys at full load to some 7.5 henrys at 50 ma. These are actual measured values, certainly accurate to better than 10%, and not nominal name-plate ratings. The load consisted of tubular slide-wire resistances. The power transformer was specially designed for good regulation but is in no way abnormal or grotesque, being of about cus-

tomary size and weight. The resistance of the two chokes was also about normal, being 60 to 70 ohms each.

The voltage drop is marked off (Fig. 6) for a full load of 350 ma. as representing customary amateur practice. The regulation curves were carried out to the full current limit of the rectifier tubes, however, to see whether the regulation would break at overloads. The results with this circuit are obvious from the curves, which speak for themselves. At a little less than 50 ma., where Fig. 5 shows the first choke rapidly reaching the

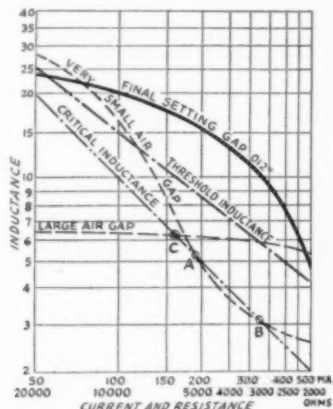


FIG. 5—INDUCTANCE OF SWINGING CHOKE IN ACTUAL CIRCUIT

Critical and threshold inductance lines are repeated from Fig. 2. The two broken line curves show the effect of too large and too small an air gap.

critical value, the voltage begins to rise as is to be expected. Since the previous article considered only the filter circuit, it might be worth emphasizing that this regulation is actually the output voltage with the complete circuit operating upon a normal 115-volt 60-cycle supply line. The voltage drop includes transformer regulation, tube drop, choke resistance drops and any effects of changes in wave shape with load.

Fig. 7 shows for comparison a filter circuit where the first choke has substantially constant value. The circuit was exactly the same as before except that the first choke was replaced by another. In the upper curve a 3.5-henry choke was used, with a very large air gap so that its inductance remained almost exactly constant. This would reach the critical value at a load resistance of 3500 ohms, or about 340-ma. load current with the voltage obtained. It will be seen from the curve that the voltage starts to rise at just about this point. The other curve was made with a slightly larger first choke, of about 5 henrys. The critical load resistance for this choke is about 5000 ohms, or 250-ma. load current, and again the voltage begins to soar at just about this point.

It is worth noting that the voltage at full load of 350 ma. (or higher) is exactly the same with all three first chokes on the same transformer voltage; but with the "swinging" first choke, soaring is prevented and regulation much improved without sacrifice of actual operating voltage.

It is possible to adjust a properly designed first choke so that its inductance will be above the critical value for low current and saturate to a value below the critical for high current. In this case the voltage might actually rise for the larger currents, and a compounding effect be obtained.² There are two very serious objections to this arrangement, however. First, the choke is inadequate to limit the current peaks in the rectifier, which is one of its most important duties, and these peaks would be excessive at full load, the very time when they should be reduced as much as possible; and second, instability of operation as described above is difficult to avoid. There are, of course, other methods of improving regulation³ but this article is concerned only with straight filter design and the improvement of regulation by the inherent characteristics of the filter elements themselves, regardless of auxiliary aids.

FILTER HUM

Having started with a sawmill, we shall end with the polish. In the test circuit used, in spite of the small second choke, the hum was within the limits usually found satisfactory in amateur operation. Little data are available on this point, satisfaction being obtained by practice rather

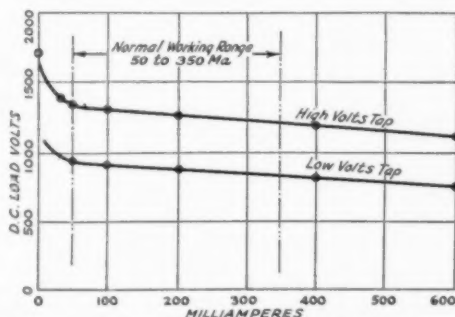


FIG. 6—REGULATION ACTUALLY OBTAINED WITH SWINGING CHOKE AND CIRCUIT OF FIG. 1
Normal load considered to have range of 50 to 350 ma.

than experiment. However, it is possible to compute ripple with a fair degree of accuracy; and smoothing circuits reported as satisfactory indicate the criterion to be a ripple voltage of about 1% of the d.c. output. The table below

² Glaser, "Improving the Voltage Regulation of Rectifier-Filter Systems," *QST*, October, 1931.

³ A "voltage-regulating transformer" method is also described by Glaser.

shows the actual volts of ripple obtained, as measured with a vacuum tube voltmeter. These are a.c. (r.m.s.) voltages. They are all under the 1% criterion with the exception of the maximum current which was slight overload, above 350 ma.

Rectifier Input Volts per Side, a.c.	D.c. Output		Ripple		
	Volts	Ma.	Measured Volts.	Calculated Volts [†]	Per Cent of Output
1050...	925	100	3.0	2.7	0.33
1050...	890	200	3.5	3.7	0.39
1025...	860	300	5.1	5.3	0.59
1000...	840	400	9.3	8.8	1.10

[†] See Appendix.

SUMMARY

We started out to design a first choke in the usual type of circuit used with '66 rectifiers which would combine as many functions as possible, taking advantage of the peculiarities of the circuit to produce desirable results. These functions may be tabulated as follows:

1. To improve regulation.
2. To limit peak current in rectifier tube.
3. To contribute materially to smoothing.
4. To provide automatic adjustments for varying loads.

All of these results can be accomplished by the proper adjustment and design of the first choke. The regulation, including all losses of voltage from the supply line to the load terminals, can be made less than 10% of average output voltage over the working range of 50 to 350 ma. The peak current is limited to very little more than the average (d.c.) load current, allowing maximum output without overloading the tubes. The choke contributes to smoothing and satisfactory results are obtained with only a 5- to 7-henry choke as the second filter inductance. The inductance swings automatically for changes in load so that it exceeds the desirable threshold inductance value from 50 ma. to 500 ma.

A first choke of this type will be much smaller than one designed for substantially constant inductance of the maximum value required. The only difficulties to be avoided are instability due to too small an air gap and resonance with first filter condenser. With condenser sizes in general use this latter difficulty is not likely to occur.

A first filter choke of this swinging type can be added to any existing filter circuit without difficulty and should improve operation materially.

APPENDIX

Voltage ripple for full-wave rectification can be calculated approximately for circuits such as Fig. 1 by means of the following formula:

$$\text{Volts (a.c., r.m.s.) ripple} = \frac{5.3E}{L_1 L_2 C^2}$$

where supply line is 60 cycles,

E is transformer secondary voltage per side,

L_1 is first choke inductance, henrys

L_2 is second choke inductance, henrys

C is total shunt capacitance, μfd .

The inductance values for calculating the ripple were taken as follows (from actual test curves):

Ma.	L_1	L_2
100	19 h.	6.8 h.
200	15 h.	6.3 h.
300	11 h.	5.8 h.
400	7.6 h.	5.0 h.

These data are only correct when smoothing to 5% or better, and when any L and C resonant frequency is less than one-half of 120 cycles. The constant (5.3) assumes that 60-cycle full-wave balanced rectification is used. This covers

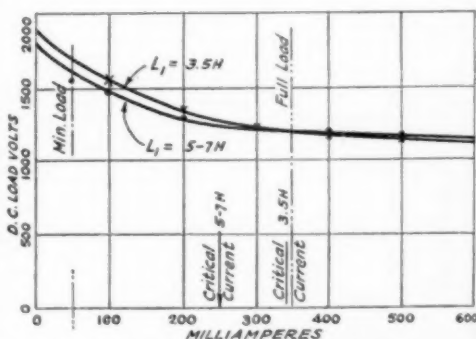


FIG. 7 — REGULATION OBTAINED WHEN FIRST CHOKE IS OF FIXED INDUCTANCE

The voltage rises rapidly when the current falls below a value corresponding to the critical condition for the first choke employed.

the majority of satisfactory filters in use. For poor smoothing the actual ripple will be much greater than that indicated by the formula.

Strays

G6TP and G6NI have been working two-way over a distance of 15 miles on 2½ meters. Both 'phone and c.w. are used.

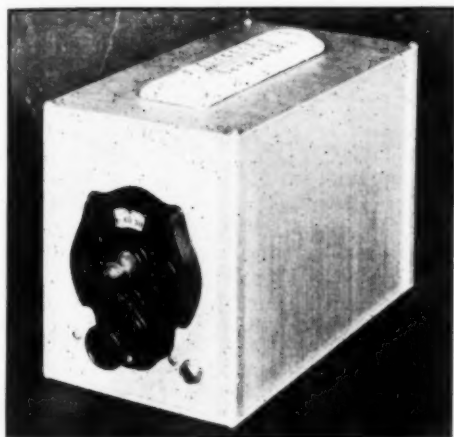
Prof. Myres, W8AJK, of West Virginia University, has discovered a new way to QSY with crystal. He finds that dropping a crystal on the floor a sufficient number of times will eventually cause it to become several smaller crystals whose frequencies seem to be slightly different. W8TP's cooperation in contributing crystals made the experiment possible.

Temperature and Monitor Calibration

By Thomas S. Wildman, W9DIB*

ALTHOUGH the calibrated monitor has often been discussed in past issues of *QST*, there has not, to my knowledge, been any discussion of temperature as a factor influencing calibration. Temperature changes can have a considerable effect on the accuracy of a calibration curve, especially during the summer when room temperatures are subject to rather wide variations.

The writer recently constructed a monitor with a view to calibrating it, and it was therefore built carefully and solidly. It uses a Type '99 tube



THE MONITOR ON WHICH MEASUREMENTS WERE MADE

The thermometer is mounted on top. The circuit is quite conventional, the tube being a Type '99.

in the conventional tickler circuit. The coils are lacquered into place on the form to prevent inductance changes, and the tuning condenser is reconstructed to have heavy rotor and stator plates with ample spacing between them, thus reducing the chance of a change in its capacity curve. Rigid wiring is used throughout. The batteries were brand new when the monitor was first put in service.

This monitor has wide band-spread on the 7000-kc. band. The dial has 100 divisions, 7000 kc. being at 11, 7100 kc. at 32.5, 7200 kc. at 55.5, and 7300 kc. at 80.5, when calibrated at a room temperature of 68 degrees Fahrenheit. A calibration curve was drawn up at this temperature using a standard frequency transmission of WIXP. On checking the calibration at the next standard frequency transmission I was very much disappointed to find that the 7000-kc. point was

11 dial divisions "off." I thought at first the batteries were running down, but the voltages checked satisfactorily. The room temperature at this time was 80 degrees.

Believing the temperature change to be the cause of the discrepancy in calibration, an investigation was undertaken to prove or disprove this theory. A series of calibrations at various room temperatures was taken on a frequency of 7000 kc., this frequency being available daily by using the seventh harmonic of the local broadcasting station, WOC. The accuracy of this harmonic is very high, the fundamental varying only a few cycles over a period of a year. The frequency is maintained very closely to permit synchronous operation of WOC and WHO. During the tests the filament and plate voltages were carefully checked, and the frequency changes were compared with room temperature changes. It was through these checks that the conclusion was reached that the temperature was the "bug in the box."

A thermometer was mounted within four feet of the monitor and readings were taken with room temperatures ranging from 68 to 101 degrees F., a 33-degree variation. At 101 degrees it was found that 7000 kc. was 21 dial divisions away

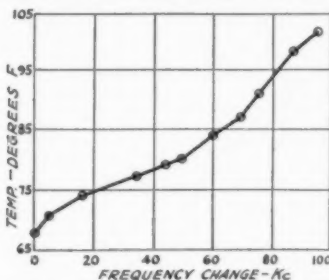


FIG. 1. — THIS CURVE SHOWS THE CHANGE IN FREQUENCY ENCOUNTERED

when the room temperature varied between 68 degrees and 101 degrees Fahrenheit. The thermometer was four feet from the monitor.

from the calibration taken at 68 degrees. This variation was as great as that caused by condenser tuning to cover the frequencies between 7000 and 7100 kc. at a temperature of 68 degrees. Or taking it the other way 'round, the monitor frequency changed approximately 3 kilocycles for each degree change in room temperature.

In a later test a thermometer was mounted directly on top of the monitor box. Measurements with temperatures ranging between 65 and 85 degrees resulted in the curve of Fig. 2. These readings are believed to be more indicative of

* 1002 Brady St., Davenport, Iowa.

actual temperature changes within the monitor box than those taken with the thermometer some distance from the monitor. Probably the irregularities in the curves are due to a lag between the temperature changes outside and inside the box.¹

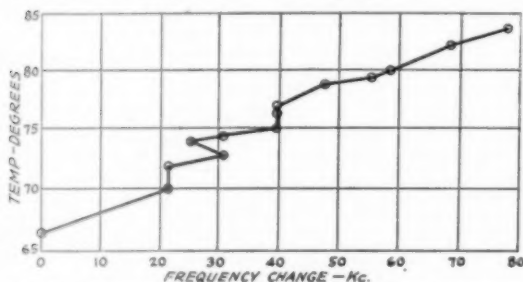


Fig. 2.— ANOTHER CURVE WITH THE THERMOMETER MOUNTED ON THE MONITOR

Indicating the same sort of frequency change, although the "kilocycles per degree" value is somewhat different. Probably this curve is more representative than the other because the temperature readings are closer to the actual temperatures inside the monitor.

From these data it appears that the effect of room temperature on the frequency of oscillation must be taken into account if a monitor calibration is to be dependable.

¹ Possibly the unusually large frequency drifts shown by the author's curves are in part due to the use of a very small tuning capacity across the inductance. Minute changes in capacity will have a relatively large effect on frequency unless the minimum capacity in the circuit is large. This is the reason for the use of tuning condensers with circular rotor plates giving a large minimum capacity in frequency meters. — Editor.

Financial Statement

BY order of the Board of Directors the following statement of the income and expenses of the American Radio Relay League, Inc., for the fourth quarter of 1931 is published for the information of the membership.

K. B. WARNER, Secretary.

STATEMENT OF REVENUE AND EXPENSES FOR THE THREE MONTHS ENDED DECEMBER 31, 1931

REVENUE	
Advertising sales, QST.....	\$15,179.51
Newsdealer sales, QST.....	12,247.08
Advertising sales, Handbook....	3,490.00
Handbook sales.....	5,912.11
Beginners booklet sales.....	268.34
Membership dues.....	13,569.87
Membership supplies sales.....	2,227.85
Interest earned.....	350.01
Cash discounts earned.....	249.95
Bad debts recovered.....	50.00
	<hr/>
	\$53,544.72
Deduct:	
Returns and allowances.....	\$ 3,496.12
Cash discounts on sales.....	252.69
Exchange and collection charges.....	17.22
Increase in provision for newsstand QST returns.....	495.44
	<hr/>
	\$ 4,261.47

Less reduction in provisions for newsstand Booklet returns....	\$726.78	
		<hr/>
		\$3,534.69
Net Revenue.....		<hr/>
		\$50,010.03

EXPENSES

Publication expenses, QST.....	\$11,274.84
Publication expenses, Handbook.....	2,487.74
Publication expenses, Booklet....	124.29
Membership supplies expenses....	1,221.65
Salaries.....	19,649.26
QST forwarding expenses.....	519.16
Telephone, telegraph and postage.....	1,355.11
Office supplies and general expenses.....	1,917.32
Rent, light and heat.....	1,183.84
Traveling expenses.....	355.47
Depreciation provision.....	346.62
Communications Department field expenses.....	103.68
Headquarters station expenses....	110.30
Bad debts charged off.....	284.65
	<hr/>
Total Expenses.....	40,933.93
Net gain from operations.....	<hr/>
	\$9,076.10

Strays

Pity the poor Technical Information Service. One of the latest questions is whether we can furnish a photograph of the Unknown Soldier!

A little suspected source of noise in receivers that use metal panels is the vernier dial with a disc at the back. Even though grounded, any rubbing between disc and panel will make a noise similar to condenser bearing QRN. The cure is to insert insulation between dial disc and panel. Celluloid or paper will work OK.

— W6CKS

Raytheon or similar gaseous rectifier tubes can be used to indicate r.f. in the same way as neon bulbs. They are less sensitive than the small neon tubes, however.

— Raymond Popkin, Brockton, Mass.

An old razor blade makes an excellent spring for the bug recently described in QST. With a little care the edges of the razor can be chipped off. This will fully take the place of the rare corset strips.

— W6FAU

W5LB uses an "A" eliminator to give him a time delay in turning on the plate power after the transmitter filaments are lighted. The output of the eliminator builds up rather slowly when turned on, and is used to energize an old telegraph sounder rebuilt into a relay. The tension on the relay can be adjusted so that the plate circuit is closed from ten to thirty seconds after the filaments reach their operating temperature.

Radio Efficiency?

By Victor L. Osgood*

AS IMPROVEMENTS have gone forward in both the mechanical and electrical designs of radio sets, we have become more and more satisfied with the results until we may safely say that we now have a very good mechanical reproducer of voice and music. There will be more improvements from time to time, even though we could get along very nicely with what we have now.

If we consider a radio receiver from the viewpoint of efficiency, we run into a rather astonishing set of figures which makes one think that someone has made a slip somewhere. The answer is, of course, that this is one piece of electrical apparatus which is inherently inefficient and no one tries to improve that particular end; that is, from a strictly "efficiency" viewpoint. When filament currents were brought down from 1 ampere to 0.25 ampere to save battery drain, it is true that there was an improvement in efficiency; but as soon as we learned how to use sets on a.c. successfully, we went back to more watts in the filaments. The inconvenience of the storage battery running down caused the improvement, rather than a desire to increase efficiency.

Electrical apparatus as a whole is fairly efficient. Motors vary considerably according to size, duty and source of power but make a respectable showing. Transformers for heavy duty work run as high as 98% efficient under full load. On the other hand, tungsten lamps are only about 10% efficient, the other 90% being wasted in heat. Paradoxical as it may sound, resistors are usually either 100% or 0% efficient, depending upon what their purpose may be in the circuit. If heat alone is desired from the resistor, then it is 100% efficient; while if it is used only to reduce voltage, then the power lost in it is a total waste and the efficiency is zero.

Let us pick the radio set apart and see how efficient (or inefficient) the different pieces of apparatus are. We have two channels to follow, both of which are somewhat theoretical and far from universal. We may follow the signal from the antenna to the loud speaker or we may consider the efficiency from the a.c. power line to the loud speaker. In either case the efficiency will vary according to the strength of the received signal, the position of the volume control and the

frequency; so that, in order to get a general idea, we will have to choose some specific values. We will take the average amplification of the Type '01-A, '26 and '27 tubes as 5 and consider the input and output voltages to be applied across equal resistances. (While the grid input impedance is considerably different from the plate impedance, still there is power lost in the effective resistance of each tuned circuit, resistance coupler or audio-frequency transformer preceding the grid or in series with the plate, and the assumption just made is considered

reasonable to cover average conditions.) This amplification means a multiplication of power (even though not yet useable for audible purposes) of 25 times; or an "efficiency" of 2500%, considered from the viewpoint of signal amplification alone.

But 1.25 watts are being put into the filament of the Type '01-A, 1.57 watts into the filament of the '26 and 4.37 watts into the heater of the '27; and into the plate circuit

of each goes about 0.6 watt. In actual power we get out, when the plate signal voltage is 1 and the load 100,000 ohms, the astonishingly low value of 10 micro-watts. The average input for the three types of tubes is 2.4 watts; this constitutes an efficiency of 0.000416%. (Efficiency experts are not supposed to throw away their tubes upon reading this.)

Adding the input signal power to that of the filament and plate would not noticeably affect this last result, so that 0.000416% represents the efficiency of the tube under the conditions stated. However, let us give the tube a break, since it is performing its job pretty well. A voltage amplification of 5 means a gain of 34 decibels; 0.000416% efficiency means a loss of 53.8 decibels. The total loss, then, is $53.8 - 34 = 19.8$ decibels, or an efficiency of about 1% — a big improvement over the 0.000416%.

The Type '71-A tube looks considerably better although even here we must select a certain volume level of output in order to get any results; so let us choose the maximum undistorted power output of 0.7 watt. The input to the filament is 1.25 watts, and to the plate 3.6 watts, making a total of 4.85 watts. Hence, the maximum efficiency obtainable with this type of tube is $\frac{0.7}{4.85}$, or 14.5%. (We don't have to

Here is a thought-provoker for efficiency experts radio-wise. What do you mean when you say that a set has "good efficiency?" Do you know that from one point of view a receiver can have an apparent efficiency of seventeen million million percent and at the same time, from another point of view, be but a quarter of 1 percent efficient? Try the method on your transmitters, too. We see a lot of hot radio club arguments in the making. — EDITOR.

* St. Cloud Avenue, West Orange, N. J.

(Continued on page 88)

More About Audio Selectivity

By L. W. Hatry*

THIS is an attempt to add a few pointers to the much-needed information given in the recent article¹ on band-pass filters. It is a sort of addenda written from the point of view of one practical filter builder.

The double-tuned circuit "C" in Fig. 1 of the January article is appreciably more selective than a single circuit and is adjustable in its band-passing effects. It can be compared to the modern i.f. transformer of a superheterodyne, the chief difference being that one operates at audio frequencies, the other at radio frequencies. If the coupling between the two tuned circuits is properly adjusted,² a single peak is obtained. Increased coupling gives two peaks close together which can flatten the tuning curve into a band.

In adjusting the transformer, first, follow the instructions in the January article for tuning the circuits to the same frequency, then, coupling coils can be wound on one idle leg of each core and paralleled. This will be recognized as "link" or feeder coupling — a two-wire line terminating in small inductances coupling to the tuned circuits. Both coupling inductances should be identical and adjusted until good transfer is obtained with or without broadening of the peak. Other coupling methods may be used but they complicate practical adjustment.

From the viewpoint of simplicity tuned circuits have decided advantages. Hull has well pointed out their disadvantages. Working out of a screen-grid tube, which has inordinate impedance, voltage amplifications up to at least 100 are made possible by pushing L_1 up and C_1 down according to the formula,

$$Z = \left(\frac{L}{C} \right) \frac{1}{R}$$

for a tuned-circuit wherein the resistance of C (farads) is negligible compared to the resistance of L (henrys). To speak in one illustrative set of arbitrary figures, a 30-henry inductance in parallel with a capacitance of 90 μfd . (if the L were sufficiently low in distributed capacity — unlikely — to allow it to tune to 1000 cycles), with L having the very usual R of 200 ohms, a value for Z of 166 megohms could be obtained, allowing a tube gain of nearly 400 for a Type '24 at 1000

cycles. This will not happen in practice but it indicates the importance of keeping C where it is cheapest and L in the standard choke region; economy and effectiveness happen to run hand in hand. Obviously the grid as well as the plate circuit must be of high impedance because the grid-filament capacity of the tube following becomes part of the tuned circuit. The only load on it will be the demand of the tube mechanism for excitation which, with the tube properly biased, is generally regarded as no load, since the grid takes practically no current.

And this is a good place to mention that 1000 cycles is by no means a magic figure. Commercial chokes and condensers readily lend themselves to frequencies down to 250 cycles, all of which, once the headset is on the ear, are highly effective operating frequencies from all viewpoints.³

An unbiased tube should not be allowed to spoil a tuned audio circuit. This is important. If the grid of a tube goes positive it becomes a relatively low resistance across the grid tuned circuit. The result is to broaden tuning and to reduce amplification. The tube following the grid's tuned circuit should be biased negative at least $4\frac{1}{2}$ volts for a plate voltage of 90 if Type '27, '01, '30 or '99 tubes are used. The tube also should be kept from overloading by means of a volume control either ahead of the tuned unit or by means of a high-resistance potentiometer across the grid tuned circuit with the adjustable arm running to the grid. In the latter case the grid tuned circuit should show, by the formula given, an impedance equal to the potentiometer resistance. This is important. The tuned circuit may have less, but it should not have appreciably more, impedance than the potentiometer. It is perhaps simpler merely to use an audio stage before the tuned stage and put the volume-control there.

The "ringy" and hollow echoing characteristic of tuned audio can be alleviated. It must be alleviated if we are not to be psychologically disturbed by something to which we can offer no buffer of habit. The trick is simple. Overbias (down to the lower knee of $E_g - I_p$) the tube following the filter and deliberately create harmonics. Harmonics will give the resonant pitch quality more nearly on the order of sounds familiar to the ham ear. With sufficient audio gain this bias can

* Hatry & Young, 203 Ann Street, Hartford, Conn.

¹ Hull, "Selectivity in Radiotelegraph Reception," *QST*, Jan., 1932.

² This form of circuit, tested vigorously in the preliminary study of the subject, was found difficult to adjust. Thorough shielding of the two tuned circuits and the use of a coupling link simplified the adjustment but introduced constructional difficulties. Experience with the circuit resulted in progression to others. — EDITOR.

³ Most of the operators seem to show preference for the frequencies between 800 and 1000 cycles. Most 'phone headsets show a similar preference. A receiver fitted with an effective filter operating around 250 cycles appears to be extremely difficult to hold on frequency. Possibly the structure of the musical scale explains this. — EDITOR.

be set so that the interfering signal, if weaker, causes less distortion and has a different character from the wanted signal, thus adding that difference to the overall selectivity. This scheme is more effective if the fundamental is below 1000 cycles, but it gives good results in any case.

REGARDING THE BAND-PASSES

The low-pass and band-pass filters are subject to several practical hints which I think will aid in increasing their effectiveness not so much as filters but as amplifier couplings.

First, we must remember that we have two types of impedance matches to consider when working with tubes; one is for voltage amplification and the other for maximum power transfer. The first applies to the usual amplifier and tuned-circuit amplifier. Here the maximum tube voltage gain⁴ (tube from which the coupler is working) occurs if the tube looks into an impedance several times its own impedance.

The second applies to most filters working out of a tube, since usually the filter has several times the loss of a single transformer or tuned circuit or tube input. Unless we are able to measure this loss and know exactly where we stand regarding its proportion to power available, or are able to establish by measurement an efficient set-up, we must assume that the impedance match must be of the type required for maximum power transfer. This condition occurs when the impedances being tied together are the same. I point this out in detail to avoid the confusion I have frequently noticed in amateur discussions.

As Hull indicated in his article, we can match a 40,000-ohm filter to a 10,000-ohm tube with a 1-to-2 transformer. Transformer impedance varies approximately as the square of the turns, or voltage, ratio. But we must remember also that this transformer should have a 10,000-ohm primary at about 1000 cycles for the band-pass Hull described; that is, a 2-henry primary. A small audio transformer (but preferably well-made) usually hits in this region, having from 2 to 8 henrys; an adjustable core air-gap will allow inductance variation to avoid spoiling a good filter with reflections. Used with the low-pass filter, a one-to-one transformer with a 2-henry primary and secondary will tend to produce semi-band pass effects by being inefficient from 1000 cycles down.

If we are content to add yet another transformer to the lay-out, we can avoid feeding the filter directly to the next tube and make a further improvement. The tube impedance at 1000 cycles (grid circuit) tends to level near 400,000 ohms (in this case the capacity of the tube input is not absorbed as part of a tuned circuit but instead

acts as a shunt or by-pass load) and can be approached with a transformer which again can aid our frequency discrimination. Ignoring the need of special transformers for the ultimate performance, it will be wise to make the best of what is available. Our job is to raise 10,000 or 40,000 ohms to 400,000 ohms. The former requires a 2-henry transformer primary and the latter 8 henrys. The step-ups required are 1-to-40 and 1-to-10 in impedance; which, by the "squares" rule, means 1-to-6 and 1-to-3 in turns ratio. The voltage step-up then available can be well used.

Of course the unfortunate part of using to-day's transformers is that manufacturers seem to fear giving data or not to care. There are, of course, notable exceptions. Most low-priced and 1-to-1 input push-pull audio transformers can be reversed and half the secondary used to give $2\frac{1}{2}$ henrys and a 1-to-2 voltage step-up. The old Acme A-2 type has essentially a 5-henry primary and is adjustable by an air-gap core. The old Federal "big fellow" had a 1-to-3 ratio and about 8-henry primaries. The old Amertrans (1-to-6 ratio) found in some old Freed-Eisman neotronics had about 6-henry primaries. Most of these figures were supposed to be true with normal tube currents through the transformers. Certain low-priced output transformers are suitable for our needs. One is designed to run from a '47 pentode into a 2000-ohm impedance, having practically 2-to-1 turns ratio. Its inductance values happen to be about 4 henrys and 1 henry. Reversed, it will hit near 5000-to-20,000 ohm impedance ratio at about 1000 cycles and work nicely from a Type '12-A amplifier into a home-made 1000-cycle band-pass filter. The important point in buying such low-priced material is to avoid the shoddy. The low-price should mean a lesser quantity of good materials and not just cheaper materials. A reliable manufacturer's name is the safest guide.

Strays

The Aerovox Wireless Corp., Brooklyn, N. Y., publishes a booklet "The Aerovox Hi-Farad Dry Electrolytic Condenser," which in addition to supplying data on condensers of their manufacture also includes interesting information on electrolytic condensers in general. It will be sent free upon request.

W2BDJ has a novel stunt to overcome body capacity on his receiver. He puts a piece of sheet aluminum about 15 by 15 inches on his chair and connects it to ground. Body capacity is non-existent so long as the operator is sitting on the chair. The receiver has a metal panel, by the way, so it must be the operator and not the set that's at high potential!

⁴ Tube voltage gain = $\frac{\mu Z_p}{R_p + Z_p}$ if Z_p is plate load impedance in ohms and R_p is the tube impedance in ohms.

Putting Life in the QSL Card

By Louis F. Leuck, W9ANZ*

THE primary object of sending a QSL card is not to supply the other fellow with wall paper. No, to be honest, it is so that we will receive one ourselves. But after being in the transmitting game for a time the average amateur doesn't get much kick out of receiving or sending a "run-of-the-mill" type of card. The kick in the QSO is there, as strong as ever, but the card is just too impersonal. What is needed is a QSL card that will hit the recipient squarely between the eyes — something unusual; something personal. We all know that a little personal message makes a received card many times more valuable. Imagine receiving a QSL card with the OM's latest photo on it! Or a photo of his transmitter, shack, YL or anything else of which he is justly proud! It would be hard to resist answering a card like that, wouldn't it? And wouldn't it be a real pleasure to send one?

Notice the photograph that accompanies this article. This QSL card was dressed up by means of a home printing process which any amateur can use. Only a small amount of equipment which may be found in any household is needed. The method is similar to that of making photographic prints but is simpler and requires no dark room.

Since this is a chemical process the first step is to secure the chemicals. Three kinds are required. Ferric oxalate is used to make the sensitizer. One-eighth teaspoon of these crystals should be dissolved in 2 ounces of water. The developer may be made by dissolving 1/4-teaspoon of potassium ferricyanide in 2 ounces of water. The third chemical is potassium bisulphate. Its use is not essential but the color of a print may be deepened by placing it in a weak solution of the last named chemical for a short time.¹

The chemical solutions should be prepared in weak daylight or ordinary lamplight because they are light sensitive. Unused solutions may be stored in a dark place but it is better to mix in small amounts and prepare fresh solution each time printing is done.

The next step is to select a negative — ordinary film — of whatever object it is desired to

picture on the card. A spot the size of the desired picture is now "painted" on the card with the sensitizer — in subdued light, of course. This may be any blank space on your regular QSL card or a card may be designed especially for the purpose. In a few moments the solution will dry. After this the card is placed painted side up on a pad, which may be a smooth piece of board with a thickness or two of blotting paper on it. Next the negative is placed in position on the card, covered with an ordinary piece of glass and the arrangement exposed to the sun a short time. All that remains to be done now

is to remove the card and place in the developer solution. The photo will appear pronto. The card should be washed in ordinary tap water to free it of printing chemicals before laying it out to dry.

A photographer's printing frame will work a bit better than the pad-and-glass arrangement for making the exposure. When painting with the sensitizer a small piece of cloth, not too moist, is sometimes more satisfactory than a brush. No harm is done if the painted area is larger than the desired photograph. A mask, which is simply a piece of black or other opaque paper with a hole the size and shape of the desired photograph cut in it, can be used. If any trouble is experienced in interpreting any of the above instructions an amateur photographer can straighten you out in short order.

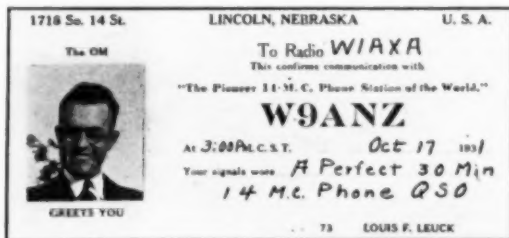
This printing process has many other uses, being especially adapted to making a small number of duplicates of written or typed pages, drawings, circuit diagrams, etc.

Strays

The metal ends of defunct Amperites make good caps for connection to screen-grid tubes. By cutting a few slices in the cap and then pinching the ends together with a pair of pliers it can be made to fit. Wire, lugs, binding posts or what have you may then be soldered on.

— C. R. Jacobson, Jasper, Alta.

W8DEH has worked all districts on 3500 kc. using a 201-A with 135 volts on the plate. He has also been reported heard in New Zealand. FB.



* 1718 So. 14th St., Lincoln, Neb.

¹ These chemicals are sold in prepared form under the trade name of "Cyanotype."

Standard Frequency Transmissions Revised for New 'Phone Bands

IN PREPARATION for the new 'phone allocations that become effective April 1, several changes in the standard frequencies transmitted by W1XP, W9XAN and W6XK are inaugurated with the March schedules. Frequencies added to the C schedules (14,000-kc. band) are 14,150 and 14,250 kc., marking the limits of the new "20-meter" 'phone band. During March the 3550-kc. point will be transmitted on the A schedules but will be dropped after April 1 when the 'phones shift to the new band 3900-4000 kc.

Instructions for using standard frequency transmissions to tune 'phone transmitters to the various bands, including the 1875-to-2000-kc. one, are given in another article in this issue. It should be unnecessary to urge 'phone operators to use these transmissions, although our experience is that, proportionately, dyed-in-the-wool 'phone men are less frequency-conscious than most amateurs. The number of standard frequency reports received from 'phone men runs about inversely proportional to the number of off-frequency 'phones. In the recent frequency-measuring test, for instance, less than 1% of the total number of reports received came from stations "exclusively 'phone." It would seem that fellows who boast that they "haven't a key in the place" might well add, "nor a frequency meter, either." Let's have more reports from the 'phones. Here are the current schedules.

DATES OF TRANSMISSION

Date	Schedule	Station
March 4, Friday	C	W6XK
March 6, Sunday	C	W1XP
March 11, Friday	A	W1XP
	B	W9XAN
	B	W6XK
March 18, Friday	BB	W1XP
	B	W9XAN
	A	W6XK
March 19, Saturday	BX	W6XK
March 20, Sunday	C	W9XAN
March 25, Friday	BB	W6XK
	B	W1XP
	A	W9XAN
March 27, Sunday	BB	W9XAN
	C	W6XK
April 1, Friday	C	W6XK
April 3, Sunday	C	W1XP
April 8, Friday	A	W1XP
	B	W9XAN
	B	W6XK
April 15, Friday	BB	W1XP
	B	W9XAN
	A	W6XK
April 16, Saturday	BX	W6XK
April 17, Sunday	C	W9XAN
April 22, Friday	BB	W6XK
	B	W1XP
	A	W9XAN

April 24, Sunday

BB

W9XAN

April 29, Friday

C

W6XK

C

W6XK

STANDARD FREQUENCY SCHEDULES

Friday Evenings			Friday and Sunday Afternoons		
Time	Sched. and Freq. (kc.)		Time	Sched. and Freq. (kc.)	
(p.m.)	A	B	(p.m.)	BB	C
8:00	3500	7000	4:00	7000	14,000
8:08	3550 ¹	7100	4:08	7100	14,100
8:16	3600 ²	7200	4:16	7200	14,150
8:24	3700	7300	4:24	7300	14,200
8:32	3800		4:32		14,250
8:40	3900		4:40		14,300
8:48	4000		4:48		14,400

Saturday Mornings	
Time	Sched. & Freq. (kc.)
(a.m.)	BX
4:00	7000
4:08	7100
4:16	7200
4:24	7300

¹ 3550 kc. will be omitted and subsequent Schedule A frequencies moved up 8 minutes after April 1.

² W6XK transmits 3650 kc. instead because of local interference with fourth harmonic of 900-kc. transmitter.

The time specified in the schedules is local standard time at the transmitting station. W1XP uses Eastern Standard Time, W9XAN, Central Standard Time, and W6XK, Pacific Standard Time.

TRANSMITTING PROCEDURE

The time allotted to each transmission is 8 minutes, divided as follows:

2 minutes — QST QST QST de (station call letters).

3 minutes — Characteristic letter of station followed by call letters and statement of frequency. The characteristic letter of W1XP is "G"; that of W9XAN is "O"; and that of W6XK is "M".

1 minute — Statement of frequency in kilocycles and announcement of next frequency.

2 minutes — Time allowed to change to next frequency.

ACCURACY

Although the accuracy of the transmissions is not guaranteed, those of W1XP are usually dependable to 0.001 per cent and those of W9XAN and W6XK to 0.01 per cent. The transmissions are checked frequently by the Department of Commerce monitoring stations; and the frequency standards used have been checked against the national standard maintained by the Bureau of Standards at Washington.

THE TRANSMITTING STATIONS

W1XP: Massachusetts Institute of Technology, Round Hill Research, South Dartmouth, Mass., Howard A. Chinn in charge.

(Continued on page 86)



STRAYS



A prominent amateur in Chicago advises us that he has been wrestling with a rather difficult receiver since 1928 — but fundamentally the set was known to be okay, so, with the usual “ham” stick-to-it-ivness he has not wanted to admit defeat and has until recently tried to conquer the brute. It seems that the end of patience has been reached and now the receiver is in the discards after having been named Frankenstein, the set without a soul!

KBW suggests that the fellows who have been expressing their admiration for his editorial in the January issue should take a squint at the initials at the bottom of the page.

The Hq. gang raided the automobile registration department of Connecticut this year with definite intentions, with the result that Warner's car sports a B-73, Budlong cruises with a BB-73 and Rodimon is proud of his BB-88!

The gang may be interested in knowing that recent covers of *QST* have been generated right in these offices and the photographs are of Hq. personnel — several “hams” have tried to guess who owned the Roman profile, the Grecian hands and the expression of agony, but no one has had any emotions of who would own that foot which was so prominently displayed January.

The coming International Contest is reminiscent of the old Transatlantics when quiet periods were necessary for a successful test. Should any of our members happen to run over into any of these quiet periods and receive a short call and request to “pipe down,” look at the chart of quiet periods and you will note the reason.

Here is a wrinkle for measuring the frequency of a crystal without going to the trouble of building an oscillator circuit for it. By setting the crystal on the coil of an oscillating receiver, or putting the crystal in a holder and then holding crystal and holder near the coil, the receiver will stop oscillating at the frequency of the crystal. When using the holder and crystal combination better results will be obtained if the holder is held by the terminal connected to the top plate. Harmonics of the crystal also can be picked off, which no doubt would help in calibrating a frequency meter.

— K6CFQ-BUC

Once more we stress the need for extra postage on QSL cards going to Canada and Great Britain.

The info first appeared on page 37 of November *QST*.

The engraving outfit which makes *QST*'s cover plates knows very little about radio, much about engraving. Last month they billed us “To half-tone plate of radiogram machine . . .”

K6LG points out an advertisement recently appearing which mentioned a 50-watt tube having a plate current rating of 175 amperes. We agree that this is the first we have heard of these tubes being used as arc-welders.

The new Rules and Regulations of the Federal Radio Commission appeared early in January, being 156 pages of loose-leaf, 9 x 6. Copies of the complete publication are being sent to the 4200 station licensees other than amateur, while every amateur station licensee will receive the four pages containing the amateur regulations. Amateurs will find the complete publication well worth possessing. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, for 46 cents (check or money order, no stamps), but the Government does not sell the binders. “Change sheets” will be printed by the Commission from time to time, to keep the copies up to date, and will be sent free to the licensees affected, or to others upon request.

To make it a fitting companion piece to our new 9th edition Handbook, the Government turns out the new amateur callbook in a yellow cover. Of course it isn't nearly as pretty as our Handbook yellow, and so on, but still it's yellow. Incidentally, that's some callbook now — 427 pages, five-eighths of an inch thick, 22,739 hams! This year's price is 35 cents.

Ross Hull has just completed an entirely new receiver designed for operation on the band of wave-lengths between 0.7 and 0.4 thousandths of a millimeter. It has a single tube (7 feet long) and a gain of about 3000 over the naked eye. Yes, it is a 10-inch astronomical telescope.

From Poughkeepsie, N. Y., R. J. Mahler, W2BWG, reports “local strength” reception of W2XAW, the 51,000-kc. transmitter of the G. E. Co. at Schenectady. He also gets walloping signals from W2XF at Cliffwood, N. J., on 44,000 kc. and from the 45,000-kc. N.B.C. station in New York. A “*QST*-type” super-regenerative receiver is used.

Amateurs who are in the habit of juggling with antennas in zero weather without first giving the problem a couple of preliminary thoughts are certain to get into trouble if they follow Fig. 3 on page 44 of the February issue. The insulator shown in the antenna proper shouldn't be there at all. It is the result of an effort on the part of our draftsman to interpret a twisted wire joint shown on the original sketch.

Another very pleasant sign of amateur growth is found in end-of-the-year licensing figures published by the Department of Commerce. Mr. W. D. Terrell, director of the radio division, announces that during the last half of 1931 amateur operator licenses were issued to the tune of 8676, as compared with 5633 in the last six months of 1930. Mr. Terrell says he is receiving an ever-increasing number of inquiries about amateur radio, and he considers it a fine thing both for the amateurs themselves and for the national welfare.

Only 113 of those 8676 licenses were of the extra first class. We ought to do something about that. There is a license that really attests amateur ability, created specially to certify to high amateur proficiency. More of us ought to go after it!

And now comes W9HOS with an application for membership in the 9th District Barnyard Club. Sure thing, every good barnyard has its hoss.

We learn from *The Tech* (M. I. T.) that the Radio Society has improved its transmitter by the addition of crystal control, which "makes it operate more closely to the frequency at which it transmits." Marvellous things, these crystals.

WSEYJ has christened his chronometer a "watt-hour" meter.

Electrad is now in the field with a resistor and volume control guide for broadcast receivers. The price of \$1.00 includes a year's service with revisions and new data.

Probably the imagination of many a foreign reader isn't vivid enough to imagine rising for an early sked to find the feeders in the condition of these shown in the photo. This transmission



line carries the call W1PH. Snow and sleet often make this sort of a picture in northern climes.

W8CUX, popular QSL card printer of Millington, Mich., informs us that he will make up a batch of 200 two-color QSL cards free of charge to any W amateurs accomplishing WAC during 1932 — just send W8CUX the proof. Yep, I.A.R.U. still issues certificates.

Attention, Music Transmitters!

SINCE we mentioned in *QST* the new paragraph in the F.R.C. regulations permitting the transmission of music under specified circumstances, the air has been filled with music.

One may believe that almost every 'phone owner rushed out and bought a phonograph pick-up. Hundreds of stations are transmitting music, some of them hour after hour and night after night. No good, fellows. Can't get away with it. Isn't amateur radio. Violates the reg, which reads:

372. Amateur stations may be used for the transmission of music for test purposes of short duration in connection with the development of experimental radiotelephone equipment.

Note that music transmission is permitted only if you're engaged in developing equipment. Note that even then you may transmit music only for test purposes. Note that even then the tests must be of short duration. Our notion of it is that amateurs don't communicate by playing records at each other and that too much of this sort of thing will simply spoil the 'phone bands for everybody. The circumstances specified in the regulation are so relatively rare in amateur radio that one ought to hear music in the amateur bands only infrequently. Present amateur practice is an abuse of a good regulation. Let's exercise this right cautiously, lest it injure us, lest it be withdrawn because of abuse.

The Old Timer Hangs a New Sky-Wire

By Eugene A. Hubbell, W9ERU*

R-R-R-R." Lee leaned over and shut off the receiver, then lazily picked up the telephone. "Hullo!"

"Hello yourself. Say, Lee, I'm putting up a new sky-wire this afternoon and I wanted to try something different in the way of an antenna system. I'll be over in a minute and meanwhile you get some dope ready for me, will you?"

"Sure, Ed. Make it snappy, though, I'm going away early this afternoon. I'll get some drawings ready for you and give you the dope in no time."

"See you in five minutes, then. So long." A faint click announced that Ed. had hung up.

"Wonder what Ed. has a *Handbook* for?" Lee said to himself as he returned the receiver to its

"Gosh, yes, I see. But don't talk so fast; you'll strain something. What's that third diagram?" Ed. indicated C of Fig. 1.

"That's a Marconi type antenna, the other of the only two types of antennas there are."

"What's that?" Ed. interrupted. "There's a whole bunch of types of antennas, not just two."

"There are only two main types of antennas, just the same; the Marconi and the Hertz. The Marconi type antenna has one end grounded and the Hertz is suspended free of the ground entirely. All the other kinds of antenna you are thinking of are just variations in ways of feeding one or the other of these two. Don't forget that, whatever you do." Lee sketched some more, producing A of Fig. 2. "See, here is a Hertz antenna with the voltage and current distribution shown. Here is another point for you to remember. A Hertz antenna always has maximum voltage or a voltage 'loop' at either end. Consequently there is also zero current (a 'node') at either end. In the case of a Hertz antenna operating on its fundamental frequency — that is, the lowest frequency at which it will resonate — there is also maximum current or a current loop at the center and, of course, zero voltage. The distribution on harmonics is somewhat different, but the point to remember is that the ends of the antenna have high voltage and zero current. Get me?"

"Where did you get that dope, anyway? I usually don't read those articles in *QST*, because they have too many *x*'s and *y*'s for me to remember what it's all about when they get done."

Lee looked disgustedly at Ed. "Yeah, you poor nut. That's the reason why I have to spend my good time on you every so often, trying to drill good radio in a skull so thick it 'can't understand' *QST* just because of a few symbols. Well, I found it all in the *Handbook*, where you could have found it, too."

Ed. threw up his hands in pretended fright. "Don't climb all over me. I'm not a technical expert, and I'm still too busy working fellows to worry about a lot of theory."

"That's all right, but remember there is no harm in reading a little theory occasionally. Who knows, some of it might penetrate! To get back on the job, an antenna feeding or exciting system is usually named from the point at which it excites the antenna. A voltage feed excites the antenna at a point of high voltage, and a current feed couples at a point of high current. The old single-wire 'antenna-counterpoise' system isn't truly an antenna-counterpoise arrangement at all, because a true counterpoise should have a

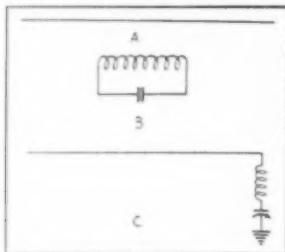


FIG. 1 — A AND B ARE BOTH MEMBERS OF THE same family. C is a Marconi antenna, the other of the only two basic types there are

hook. "Oh, well, there are some fellows who just can't get much from a printed page." And turning to a handy pad on the operating table, Lee started drawing. Let's look over his shoulder. First, a straight line. Second a coil and condenser connected in a closed circuit. Third, a grounded antenna system. Fourth — but at this minute Ed. bursts in the shack door.

"Made it in three and a half minutes even. Bet you wish you could get that out of your crock, Lee. Well, what's the dope?" Ed. dropped into a chair.

"Listen here, young feller. I'm not going to spend much time on you. Just glue your ears down flat and listen. Look here. See this straight line labeled A? Well, that's a Hertz antenna. See that coil and condenser? That's a closed oscillatory circuit. What's the relation? No, don't answer — this is a monologue. I'll just tell you. They are both members of the same family, but aren't brothers by any means. They are both oscillatory circuits, but the Hertz antenna is an open oscillatory circuit while the coil-condenser combination is a closed oscillatory circuit. See?"

*227 No. 4th St., Rockford, Ill.

large capacity to earth and a single wire doesn't meet that requirement, by a long shot. The single-wire antenna-counterpoise is just a bent Hertz antenna with the coupling coil at the center (current loop). Remember when everyone claimed it was impossible to work such a system on its second harmonic? No wonder! On the second harmonic there was no current loop at the center. Look here, I'll draw it for you. See, the current loop isn't at the center in this antenna on its second harmonic; it is a quarter-wave in from either end. (Fig. 2B.) The third harmonic, though, was all right for this style of feeding." (C of Fig. 2.)

"So that's why. I don't believe one guy out of a dozen knew that years ago. We used to have lots of arguments about it, too."

"Yes, I'll bet you did. Well, another current-feed system is the tuned two-wire feed. Say, before I get into that, what is the trouble with using this bent Hertz affair I just showed you?"

Ed. considered it for a minute. "Well, a forty-meter antenna in the old days was always so short it couldn't be put up high if the station was on the ground. I can't think of anything else."

"Pretty close. The trouble was just this: The antenna itself had to come inside the station. That's why we are using entirely different types nowadays, to put the antenna outside, away

it doesn't work any too well on the next harmonic unless the feeders are of such a length that they can be series or parallel tuned to any odd number

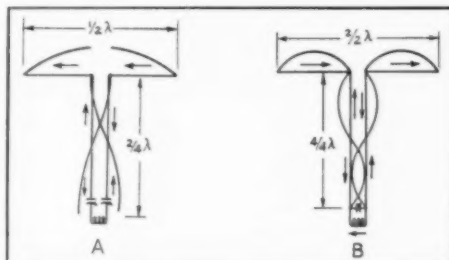


FIG. 3—". . . THIS TWO-WIRE CURRENT-FEED affair is connected to the center of the antenna for fundamental operation (A) . . . it will work very well on even harmonics of the radiator as a voltage-feed system" (B). The feeder length is half-wave with series tuning for fundamental operation and full-wave with parallel tuning for second-harmonic operation

of quarter waves. Then it will work very well on even harmonics of the radiator as a voltage-feed system. Oh, yes, I forgot to say that the length of a two-wire line for a current-fed Hertz must be electrically equivalent to any *even* number of quarter waves." (Fig. 3A and B.)

"That's all right for these stations parked between a pair of big towers. How about me?" Ed. queried.

"Well, your case of a pole on the house and one on the garage fits about nine-tenths of us, I think. Consequently, a voltage-fed antenna is usually best, since there is always that voltage loop at the end of the Hertz antenna. A two-wire feed line may be used for this antenna too, but in contrast to the length I said was right for the current feed line, this must be any *odd* number of quarter wavelengths. Right now I want to say that it is not necessary that the length be exactly right to the last inch. It can be a little off and be compensated by series or parallel tuning of the antenna tank coil and condenser; series tuning if too long, parallel if too short. Thus, a 40-foot feeder can be cut down to one-quarter wave for 7-mc. operation, and brought up to three-quarter wave for 14-mc. operation."

"You haven't said anything about this single-wire feed affair as yet, though. What is that system, voltage or current feed?"

"That's something radically different. In these two-wire feed lines we have been considering, the feeders are resonant and there are standing waves on them at all times; the only reason they don't radiate is because their fields cancel each other out, being exactly equal and opposite if the feed-line is correctly built. The single-wire and double-wire feed you are thinking of is a horse of a different color. That depends on matching the impedance of the feed-line to the impedance of a portion of the antenna. In that

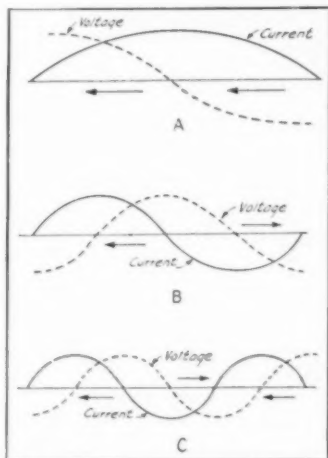


FIG. 2—"A HERTZ ANTENNA ALWAYS HAS Maximum Voltage or a voltage 'Loop' at either end." A, B, and C show the voltage and current distribution when the antenna is operated at its fundamental, second harmonic and third harmonic, respectively. The arrows indicate the direction of current flow at a given instant. Note that the current flows in opposite directions in any two adjacent half-wave sections

from everything else, and feed it by a non-radiating link with the transmitter. Well, this two-wire current-feed affair is connected to the center of the antenna for fundamental operation, since at that point there is a current loop. Consequently

case it makes no difference how long the feeder is, since there are no standing waves on it. And it makes a very efficient method of feeding the antenna, too, since the wires do not have to carry heavy currents, and energy transfer is very easily accomplished, since, as the *Handbook* says right here, 'the maximum transfer of power output from one circuit to another is possible when the circuit impedance is equal to the line impedance'!"

"You're way over my head. Never mind, though, I'll get out the *Handbook* tonight and do my best to figure out what it's all about."

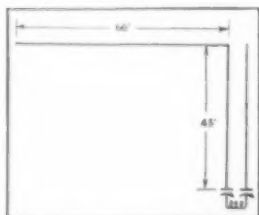


FIG. 4—" . . . CUT THE FEEDERS TO 45 FEET . . ."

Lee thought for a minute. "It is best that you use a two-wire voltage-fed affair for your place, I think, and your mast is high enough to use 40- or 45-foot feeders. It is much easier for anyone not very much experienced in this stuff to put up a tuned two-wire feed system than a matched-impedance affair, so I wouldn't advise you to try it yet. Now about the lengths. That back yard of yours is long enough for a fundamental 7-mc. or 'forty-meter' antenna. Notice I have been talking a lot of 'meter' stuff in this. Well, it is much simpler to deal in meters than in kilocycles when speaking of antennas, since there is a very simple relation between the fundamental or highest natural wavelength of the antenna, and its length in meters. On the average, the fundamental wavelength is the length of the radiator in meters multiplied by about 2.1; or the length in feet is about 1.56 times the wavelength in meters—but this figure varies somewhat over a narrow range. This is because the velocity of a radio wave on a wire is not the same for all conditions and is always somewhat less than that of a wave in free space."

"So that's why you haven't been spraying 'kilocycles' and 'megacycles' all over the place. How about tuning those feeders?"

Lee sketched another diagram, that shown in Fig. 3. "This is the reason I said 45-foot feeders. Just pretend I'm DX now and you have to hold your breath to make me out, just as you would on that old receiver of yours."

"Old receiver, my eye! I can get more stuff on that in one night than you can in a week on your junk heap."

"Well, you know the idea, so listen carefully anyhow. An amateur puts up a 7-mc. fundamental Hertz with a two-wire tuned voltage-feed system, commonly called the Zepp, and in the majority of cases has cut his feeder system to 30 feet, or approximately a quarter wave. Then the

poor guy goes up to 14 mc. and tries to series-tune the thing; and what does he get? Nothing. The darned thing just won't tune. And no wonder; he has a feeder length of an *even* number of quarter waves. So I say, cut the feeders to 45 feet, then with a series condenser or a pair of series condensers you can get them down to an electrical length of one quarter wave on 7 mc. and to three quarter waves on 14 mc., and tune them fine. (Fig. 4.) Well, that's all the time I'm going to give you now. You'll find a lot more dope on the Hertz antenna in the *Handbook*, so don't bother me any longer."

"Thanks a lot, Lee. Sure sorry to take up your time, but watch me poke out with this new sky-wire. No more antenna-counterpoise contraptions for me. My antenna is now—if I remember all the grand words you spilled—a '7-mc. fundamental Hertz antenna, fed at a voltage loop by a tuned non-radiating two-wire feeder system.' Mim—some high-sounding job."

"Hope your pole doesn't come down while you're putting the stuff up. See you later, Ed." Lee vanished in the general direction of his bedroom while Ed. gathered up the diagrams.

"A great old head, that fellow," Ed. shouted as he left the shack. "Too bad he doesn't use it."

"Huh, what's that?" Lee's head appeared at the door as Ed. climbed in his car. "Just for that I'll QRM your next DX station."

Strays

W6AWD sends in this brainstorm, taken from a local newspaper: "The installation is being made in several rooms of a specially constructed building. In the radiotelegraphic and radiotelephonic transmitting room, the machines are high velocity, in accordance with Marconi's uniform induction aerial system, the induction being fed by concentric turbines. The transmitters are moved by a direct, high tension current through a group of Marconi rectifying valves which rectify the 500-volt alternating current (which can be raised to 20,000 volts) and transfer it into a direct current which, then, is evened by means of the usual system operated by pumps."

This actually happened at W8BJ, who lives in a large apartment building: At 3:15 a.m. one day a lady who lives on the floor below thumped on the caretaker's door, and when that gentleman answered the following ensued:

Caretaker: "Why, Mrs. Blank! What's the trouble?"

Mrs. B.: "You'll just have to make that broadcasting station on the third floor quit. It keeps my bed-spring ticking all the time and I can't get to sleep."

W8BJ wants a diagram of a good wave trap to fit a superhet Murphy bed. Anybody oblige?

EXPERIMENTERS' SECTION

FREQUENCY DOUBLING

THE circuit of Fig. 1 has been called to our attention by C. C. Schmelzer, D4AAR, and David Atkins, W6VX, as showing a noticeable improvement over the usual doubling circuits. The circuit is not a new development, although possibly not many amateurs have become acquainted with it. The grids of the two doubling tubes are fed in push-pull, the plates being connected in parallel. It is well known that in the ordinary push-pull circuit the second harmonic is balanced out in the output circuit proper, but

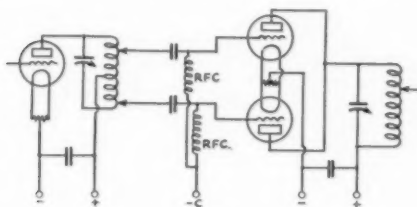


FIG. 1

flows back to the filament via the plate supply tap at the center of the output coil. In Fig. 1 the output tank circuit is connected in the circuit in such a way as to trap the harmonic.

VACUUM TUBE BLEEDER RESISTANCE

Those of the amateur fraternity who lack bleeder resistances of high current capacity should find this kink useful. The idea is to make use of a small resistor of one to four thousand ohms and

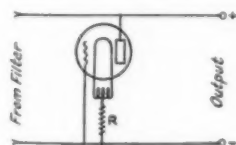


FIG. 2

an old tubesuiting that unused filament winding. A grid bias resistance of 2000 ohms does the trick on about 550 volts, using a '26 as the bleeder tube. Fig. 2 is the hookup. It is about the simplest

thing imaginable, but I have not seen it mentioned in *QST* before and I hope it will fill the bill somewhere.

— W. I. Korpi, W9HDN

VOLTAGE REGULATION

Fig. 3 is the circuit diagram of an interesting voltage regulation system used by W. C. Forrest, WIBU, Poynette, Wisconsin. When correctly adjusted the plate voltage on the Type '10 crystal

oscillator is maintained constant in spite of large fluctuations in the power supply voltage, which is nominally 1200 volts.

The operation is about as follows. The two Type '50's are biased so that with normal supply

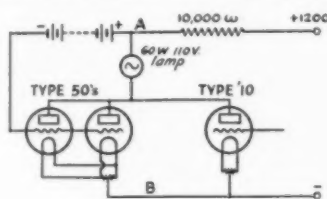


FIG. 3

voltage they take normal plate current, of approximately 40 to 50 milliamperes each. With this load plus the normal load of the Type '10, the 10,000-ohm resistor plus the resistance of the 60-watt lamp drops the voltage to the value desired on the plate of the '10. The "C" battery voltage is adjusted to reach this condition, the value in this case being about 400 volts. Under normal conditions, then, the bias voltage on the grids of the '50's is the "C" battery voltage minus the voltage drop between A and B. If the plate supply voltage should increase the current also will increase, which makes the voltage drop between A and B greater and consequently the bias voltage on the grids of the '50's less. As a result the '50's take more current, still further increasing the voltage drop through the lamp and lowering the plate voltage on the '10. By the proper choice of "C" battery voltage and the values of the two resistors the plate voltage on the '10 will remain constant with changes in plate voltage of the order of 50%.

A voltage-regulation system of this sort also has some of the characteristics of a filter, since it will smooth out rapid pulsations in the same way as a filter condenser. A disadvantage is the large "C" bias battery required. Many variations could be worked out, however, and experimenters may find the idea useful in a variety of ways.

CURING NOISY GROUNDS

Many amateurs use no ground connection, so they will not be very much interested in this story at the present time. However, it may come in handy at some future date when a ground is needed.

Here at OA4AB it was found that better reception was obtained using a ground, but from

time to time terrible crackling noises were heard when they were least needed. The operator, being interested in geophysics, thought that perhaps the noises were caused by galvanic action between the iron rod and the ground. The difference in potential between two such rods often is very great, sometimes being over 1000 millivolts. Theoretically almost any electrical or magnetic disturbance in the earth will change the potential about these iron electrodes. This can be remedied by using non-polarizing electrodes, which sounds expensive, but such electrodes can be built cheaply and rapidly.

A good electrode is shown in the sketch, Fig. 4. It must be remembered that no metallic part must touch the ground. The writer used a porous cup such as are used in Daniell cells, put a copper rod inside and filled the cup with concentrated copper sulphate solution. The copper sulphate seeps slowly through the cup and makes an excellent contact with the ground. Resistance of the electrode ordinarily is about 500 ohms, but depends on the moisture content of the ground. This electrode sets up practically no galvanic action and the problem of a drifting potential about the ground electrode is solved. This rig did the work at OA4AB. There may be a few others bothered by crackling noises in their sets who may find this to be a solution to their troubles.

— Walter Butz, OA4AB

SOME CONVERTER HINTS

Probably a good many readers who built converters of the type originally described in *QST* for July, 1930, are still using them. Here are two suggestions for improving the operation of the converter.

The first is from Theodore Clark, of 1358 E. 58th St., Chicago, Ill. He writes, "I built such a set for a.c. tubes with separate plate supply. The set perked but feebly. A long set of experiments followed which convinced me that the tie-up of oscillator plate and the detector control grid through a fixed resistor wasn't too sound; first, because it made the voltage on the one too much a function of the other, and second, because the coupling resistor of 50,000 ohms offers considerable impedance to short waves or any other kind. (This latter difficulty can be overcome by connecting a small by-pass condenser across the coupling resistor. This was found to be unnecessary in the original model, probably because the

resistor used had enough self-capacity to make its impedance small for r.f. — Editor.) Hence I finally changed the layout slightly to make the

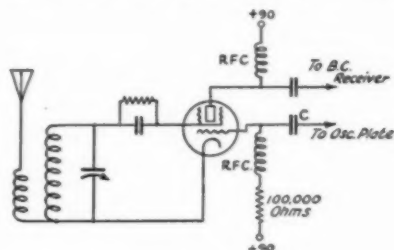


FIG. 5

detector control grid bias independent of oscillator plate, as shown in Fig. 5. The 100,000-ohm resistor gives a 20-volt bias on the control grid. The condenser *C* is mounted on clips so as to be easily changeable. I now use a .00004 Sangamo and leave it alone. Otherwise the constants are unchanged.

"This layout seems to be extremely sensitive, and used in conjunction with a superhet b.c. receiver goes down to the noise level without effort. I readily get G5SW and VK3ME on the loud speaker when the noise will permit."

The second suggestion is from Basil Cutting, WIAPK, Pembroke, N. H. The diagram of Fig. 6 explains it. The original wiring of the converter remains unaltered, but with the addition of condenser *C*, which is connected between the oscillator plate and the antenna post. This

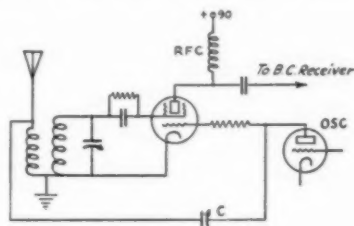


FIG. 6

condenser is a midget with a maximum capacity of about 100 μ fd. Its function is to introduce some regeneration in the first detector, thereby increasing its sensitivity. If *C* is made large enough the detector will oscillate, which is of course undesirable. Tuning and adjustment are likely to be more critical than without regeneration, but a decided increase in signal strength will result.

FILAMENT VOLTAGE COMPENSATION

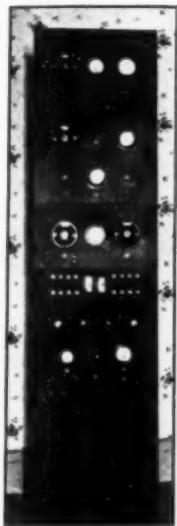
Fig. 7 illustrates a simple method of compensating for filament voltage drop when keying. Most amateurs use chokes in their filter circuits,

(Continued on page 46)

AMATEUR RADIO STATIONS

W8RV, Buffalo, N. Y.

THE accompanying photograph of the transmitter at W8RV, owned by Earnest H. Roy, 154 Wakefield Ave., Buffalo, is an excellent example of the modern type of amateur transmitter construction. Everything has been arranged for convenience in operating. The set is used for c.w. on 3.5, 7, and 14 mc., and also for 3.5-mc. 'phone.



THIS COMMERCIAL-LOOKING TRANSMITTER IS OWNED BY W8RV, BUFFALO, N. Y.

There are seven panels to the transmitter, mounted on a wooden rack similar to the standard Western Electric 101-A. The dimensions are 22½" wide and 72" high. Heavy ¾" angles are used for bases, preventing the assembly from becoming top-heavy. The two lowest panels hold a highly-filtered "B" supply for the speech amplifier, which is on the panel just above. This speech amplifier consists of one stage of '12-A and a push-pull stage with '71-A's. An appropriate input transformer permits use of either single- or double-button microphones, a microphone current meter and jack being provided for each button. Built into this

panel is a volume indicator using a '40 tube coupled to a 1½-ma. meter.

The fourth panel holds sixteen jacks as well as two key switches. These are used for various purposes, such as amplifier input and output, modulator input, keying circuits, etc. Next above is the start of the r.f. section of the transmitter. Panel five consists of a crystal oscillator and buffer stage. Type '10 tubes are used, with 250 volts and 500 volts respectively on the plates. A choice of two crystals is available by means of a simple switching arrangement. Both crystal and buffer stage are shielded in aluminum cans. The modulator and modulated amplifier stage is next, on the second panel from the top. A Type '10 tube running at 250 volts is fully modulated by a Type '50 modulator running at 600 volts. When using c.w. the modulator is cut out of the

circuit. Excitation from this stage is fed inductively to the top panel, behind which is the linear amplifier, a Type '52. Radio frequency ammeters are in the tank circuits of both the modulated and linear amplifier stages. All filaments are lighted by direct current obtained from high-capacity "A" batteries. The '52 stage is run at quarter power when used for 'phone work.

W8DWJ, Brantingham, N. Y.

A VERY weak d.c. signal announced W8DWJ for the first time on May 7, 1928. The station is owned and operated by H. F. Graves, at Brantingham, N. Y., a summer resort located in the woods on the western side of the Adirondack Mountains. At that time no power line was available so "B" batteries had to be resorted to for plate power. In 1930, rumors of a power line were in circulation so construction was started on a self-excited High-C Hartley using a Type '52. The frequency stability was not up to standard, however, so the spring of 1931 brought further improvements and the present transmitter results.



W8DWJ
THE TRANSMITTER IS AN OSCILLATOR-AMPLIFIER SET USING A TYPE '10 AND '52

The circuit is the m.o.p.a. described in February, 1931, *QST*, using a High-C Hartley oscillator and neutralized amplifier. A DeForest 510 with 550 volts is used in the oscillator and the Type '52 with 1500 volts as amplifier. The power supply for the oscillator is entirely separate and is rectified by two Type '81's and filtered by a three section filter using 2 µfd., 18 henrys, 2 µfd., 18 henrys and 1 µfd. The amplifier power supply is 1500 volts rectified by two Type '66's and filtered by two 2-µfd. condensers and a 36-henry choke. A pure d.c. note results. This transmitter

gives excellent results and compares favorably with crystal control, with the advantage of being more flexible.

The antenna is a 7-mc. Zepp with feeders tuned in parallel on 14 mc. and in series on 7 mc.

The present receiver is the conventional detector and one stage; however, all parts are at hand for the construction of a three-tube a.c. screen-grid receiver which will be assembled at the first opportunity. A dynatron frequency meter will also be added soon. At present a monitor is used to check frequency and note, and its calibration is checked often against Standard Frequency Transmissions to insure accuracy.

Many DX stations have been worked with this outfit, to say nothing of the many pleasant local contacts. Time does not permit much traffic handling, but a message is never refused and never dies. W8DWJ is silent during the winter months because of activities in Florida, and in those months W4ANS in St. Petersburg takes its place.

W2ABE, Orange, N. J.

W. H. MACGAHAN, owner of W2ABE, saw an amateur station for the first time in 1926, and not long after that was on the air with his own station. The history of W2ABE since then has been that of building, blowing tubes, and



A 204-A PUTS THE PUNCH IN W2ABE'S SIGNAL

rebuilding, with intervals of operating at sea. Early in 1931, after the last sea trip, the outfit shown in the photograph was constructed and has continued in use.

The transmitter is a Hartley oscillator using a 204-A tube, operated at about 600 watts input. As a result of careful tuning, the reports on the note and sharpness are always favorable. The power supply consists of a Thordarson 1-kw. 4,400-volt transformer, a pair of 872 rectifiers, a 5-henry choke and filter condensers totalling 4 μ fd. The antenna is a Hertz, 60 feet high, with voltage feed.

W2ABE's receiver has a stage of tuned r.f., screen-grid detector, and two audio stages.

Western Electric 'phones are used. A wavemeter and monitor complete the station equipment.

Needless to say, stations in all parts of the world have been worked. W2ABE is always pleased to QSP, chew the fat, QRS, see how fast the "bug" will go, and QSL.

Experimenters' Section

(Continued from page 44)

and the filter choke is put to use as a relay by clamping or bolting a piece of spring steel on the side of the core, as shown in Fig. 7. The free end of the spring carries a contact. A small piece of bakelite, also furnished with a contact, is fastened

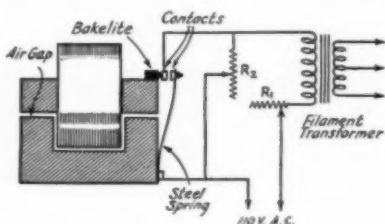


FIG. 7

to the core so that the two contacts are opposite each other. The magnetic pull of the core is sufficient to close the contacts when the set is keyed.

The operation of the system is quite simple. With the key closed (which also closes the relay contacts), rheostat R is adjusted to put the correct voltage on the filament. The plate circuit should be taking its normal power from the rectifier system. Then with the key open, the filament voltage is again set at normal by adjusting rheostat R_2 , leaving R_1 at its previous setting. This scheme has given excellent results on the 250-watt set at W3CHG.

— E. R. Gabel, W3CHG

Strays

When keying in the primary of the plate transformer there is often a "yoop" to the signal as the filter builds up and discharges. W9BHF suggests connecting a variable resistor of 1500 ohms or more across the key contacts and adjusting it so that the plate voltage (as indicated by the plate voltmeter) is the same whether the key is open or closed. If no voltmeter is available the adjustment can be made by listening to the signal in the monitor until the "yoop" disappears. The resistor must be capable of carrying the primary current of the transformer, which, with only the filter as a load, will be comparatively small.

THE COMMUNICATIONS DEPARTMENT

F. E. Handy, Communications Manager

E. L. Battey, Asst. Coms. Manager

Traffic Briefs

28-MC. AND 3.5-MC. TESTS

All amateurs are reminded of the R.S.G.B. 28-mc. tests to be held on the following week-ends: March 19th-20th and March 26th-27th. Hours of operation will be from 1200 G.M.T. on each Saturday to 2400 G.M.T. on Sunday. Report all British Stations heard or worked on 28 mc. during the "tests" to A.R.R.L. for forwarding, or direct to the R.S.G.B.

A good opportunity for two-way work with British stations on 3.5 mc. is offered with the announcement of the R.S.G.B. 3.5-mc. tests to run March 5th and 6th, and March 12th and 13th. North American amateurs especially

are urged, however, to be careful to observe the "quite periods" in the International Goodwill Tests, which occur March 10th-16th. See February *QST* for full data on the I.G.T.

M.P.W.

A correction! According to a telegram just received the dates of the British Columbia "Miles Per Watt" Contest (announced in Feb. *QST*, page 48) have been set ahead to run from April 1st to May 1st. If, between those dates, you hear any "VE5" calling "CQ MPW," you will know he is in the contest and is looking for DX contacts. This contest is being sponsored by the British Columbia Amateur Radio Association. For complete information, communicate with

Relative Traffic Standings

(DECEMBER-JANUARY)

Messages per Station (25%)	Stations Reporting Traffic (25%)	Gain or Loss (Traffic Reports) (25%)	Traffic Total (25%)	Best Based on Average of All Four Ratings (%)
Cent. 118.6	Cent. 313	N. W. ±52	Cent. 37142	Central 98.2
Delt. 111.5	Mid. 179	Cent. ±42	Pac. 13939	Pac. 75.0
Dak. 95.5	Atl. 171	Mid. ±28	Atl. 13692	Midwest 75.0
W. G. 91.9	Pac. 169	Hud. ±28	Atl. 13429	Atlantic 73.2
Pac. 82.5	N. E. 153	N. E. ±27	N. E. 9933	New England 62.5
Roa. 81.6	N. W. 111	Atl. ±20	Dak. 8028	Northwest 58.9
Atl. 80.0	Hud. 99	Pac. ±16	Roa. 6202	Dakota 55.4
R. Mt. 78.9	Dak. 84	Can. ±14	N. W. 5499	Delta 51.8
Mid. 75.0	Roa. 76	Delt. ±11	W. G. 5243	Roanoke 50.0
N. E. 64.9	Can. 70	Roa. ±9	Hud. 4635	Hudson 46.4
Can. 62.4	W. G. 57	R. Mt. ±6	Can. 4359	West Gulf 41.1
N. W. 49.5	S. E. 52	Dak. ±2	Delt. 4352	Canada 35.7
Hud. 46.8	Delt. 39	W. G. ±1	R. Mt. 2131	Rocky Mt. 25.0
S. E. 37.5	R. Mt. 27	S. E. ±40	S. E. 1955	Southeast 10.7

THE TEN HIGH SECTIONS

Nebr. 243.1	Mo. 104	Washn. ±40	Ill. 14766	Illinois 82.5
Miss. 210.1	Ill. 83	Mo. ±35	Mich. 9801	Ohio 47.5
S. D. 191.2	Mich. 76	N. N. J. ±19	Ohio 8090	Missouri 47.5
Ill. 177.8	Washn. 72	Ill. ±13	Nebr. 4862	Michigan 45.0
M-D-DC 144.7	Ohio 71	W. Mass. ±12	W. N. Y. 3978	Washington 42.5
Okla. 141.5	L. A. 52	Ohio ±10	Va. 3906	Nebraska 42.5
Colo. 135.1	W. N. Y. 45	W. Pa. ±10	L. A. 3822	Mississippi 39.0
Iowa 134.2	Va. 44	Miss. ±10	Iowa 3758	W. New York 25.0
Ariz. 131.9	E. Pa. 42	E. Mass. ±9	E. Pa. 3593	Los Angeles 22.5
Mich. 128.9	N. N. J. 35	Ind. ±9	S. Minn. 3497	N. New Jersey 22.5

1600 stations originated 28,977; delivered 19,580 relayed; 81,982; total 130,539 (67.7% del.) (81.5 m.p.s.)

Once again we report a record-breaking month in A.R.R.L. traffic history! The total number of messages handled (130,539) is the highest and the number of traffic reporting stations (1600) is greatest in the entire existence of the present field organization (by Sections) dating back to 1925! As is too often the case when our totals are high, delivery percentage dropped noticeably to 67.7%. There is no glory to high totals unless deliveries show that our traffic is delivered. Embrace every opportunity to deliver traffic and thereby do your part towards assuring 100% delivery of amateur traffic. In accepting a message you are agreeing to deliver or see it on its way promptly. Otherwise it is better not to take it at all.

This month we inaugurate a new basis of awarding the Traffic Banner. The Banner now goes to the Section making the best all-round showing of progress on the basis of (1) messages per station, (2) number of stations reporting traffic, (3) net gain or loss in traffic reporting stations compared to previous month, and (4) traffic total. On this new scoring basis ILLINOIS carries the Banner with 82.5 of a possible 100 points. Other leaders are listed above. The CENTRAL Division leads all others with an average of 98.2, with the Pacific and Midwest Divisions tied in

second place. The Northwestern, due to the energetic leadership of Washington in the "reporting" department, took first place from the Central only in its gain in "traffic reports" (col. 3). Nebraska leads all sections in "teamwork" (M.P.S.), while Missouri deserves the greatest credit for an outstanding number of reports — believed to be the greatest we have ever received from one section! Also worthy of note is the fact that the following sections have the best standing in their respective divisions, considering all four ratings: Illinois, East Bay, Iowa, Western New York, Connecticut, Washington, Southern Minnesota, Mississippi, North Carolina-Virginia (tied), Eastern New York, Oklahoma-Southern Texas (tied), Ontario, Colorado-Utah-Wyoming (tied), and Georgia-South Carolina, etc.—Eastern Florida (tied).

The listings above show the relative standings of each division and the ten highest sections in (1) M.P.S., (2) stations reporting traffic, (3) gain or loss in traffic reports, (4) traffic total, and (5) average of all four ratings. How does your section stand? If your section is not listed it indicates the need of more organized effort on the part of all stations within your territory. Work toward "making" all of the five columns! (Or make a "high" in the first four and we'll give you a place in column 5 — HI.) This month ILLINOIS was the only section to "make" all five. Ohio and Michigan made all but one of the listings. Get busy and put your section at the top!

the club station, VE9AJ, at 2961 5th Ave., East, Vancouver, B. C. All amateurs are urged to cooperate with the VE5s in their contest.

Beginners: W8CMF at Sunbury, Pa., is a new 1750-kc. code practice station. Code lessons are transmitted from W8CMF on 1765 kc. Tuesdays, Thursdays and Saturdays between 7:00 and 8:00 p.m. and between 10:00 and 10:30 p.m. E.S.T. Make use of these transmissions. W2GL, well-known code practice station, announces a change in frequency to 1765 kc. Look for him there in the future. W5AEL-W5BXD, Oklahoma City, has discontinued code practice transmissions due to a break-down in equipment.

W9GDU says the depression is so bad he can't buy wire for his wireless!

Did you start your yearly "number sheet" of originated messages on January 1st? A good number sheet is essential to the systematic handling of traffic.

On 3500 and 7000 kc. everybody wants to work W1MK. On 1750 kc. W1MK wants to work everybody!

W1AOK: "Can you speak Spanish?"
Friend: "No, but I can read it a little."
W1AOK: "Yeah. I can copy XDA, too!"

How far have you heard a fire engine via amateur radio? What a question! Yes, but K4RK claims the DX record for just that — he heard fire engines in Philadelphia while QSO W3MV on 14-mc. phone. A mike will pick up sounds, you know . . . even the clatter and clank of a fire engine. Hi, and what next?

It is said that history repeats itself. Old-Timers, listen. Do you remember that speed demon, "Chain Lightning Hill, 4GL"? Well, ex4GL is now located in Hinsdale, Ill., is signing W9UD, and keeps the same old schedule with W4BY which they had years ago. And now if that old master of the key, Larry Dunham, ex3ZY, would appear on the scene again, the picture would be complete.

WARNING!

Four More Station Licenses Revoked by F. R. C.!!!!

The amateur station licenses of Eric H. Palmer, Jr., W2ATZ, Frank A. Lentino, W2BVY, Richard M. Simmons, W2CRY, W2ZZV, and William Kessler, all of Brooklyn, N. Y., have been declared revoked by the Federal Radio Commission. One or more of the following violations are cited as the reasons for such unconditional revocation in each of these four cases:

1. Illegally using the call signal of another amateur.
2. Illegally rebroadcasting WABC, WJZ and WOR.
3. Aiding in placing an unlicensed station in operation.
4. Off-frequency operation.

In addition the F. R. C. has warned George J. Murphy, operator of W2CAR, that in view of evidence showing his knowledge of a number of the above violations of the Radio Act and the amateur regulations without making any report to the authorities regarding the matter, and also in view of alleged off-frequency operation under the call signal W2AVE, any further violation will result in immediate revocation of his station license, likewise.

BRASS POUNDERS' LEAGUE

Call	Orig.	Del.	Rel.	Total
W9CTP	504	25	1896	2425
W8DDDS	336	207	1774	2317
W8PP	27	45	2033	2105
W3CXL	104	230	1138	1472
K4IHR	582	333	314	1229
W9AFN	203	6	952	1161
W5VQ	77	85	954	1116
W9IO	66	68	968	1102
W9BNT	137	553	398	1088
W9EPJ	184	79	818	1081
W9HET	107	29	938	1074
W5APR	1000	48	—	1048
VE3GT	156	156	735	1047
W9DI	34	83	900	1017
W2BZZ	56	23	858	937
W3BWT	235	211	475	921
W8BMG	13	67	824	904
W9FUT	117	194	578	889
W9GAI	604	219	46	869
W9DNP	281	75	454	810
W4AIS	469	24	308	801
W8DBX	53	60	669	782
W6ALU	153	363	252	768
W5ANX	18	120	630	768
W9EJQ	18	34	693	745
W9CUT	302	112	322	736
W9FXE	65	47	628	730
W9ACU	193	31	476	700
W9FUE	247	126	322	695
W6AOA	186	18	488	692
W9HK	73	92	512	677
W8BAH	200	82	388	670
W5BMI	30	48	592	670
W3WO	55	18	582	655
W9LH	—	2	636	638
W3AAJ	160	89	375	624
W8DFR	72	136	412	620
W9FTW	96	27	496	619
W9FLI	109	30	465	604
W9FAU	132	10	460	602
VE3GX	52	93	453	598
W9FO	172	130	288	590
W1IP	91	45	414	550
W6AMM	235	299	8	542
K6BOE	350	150	35	535
W9BNN	100	75	352	527
W8CUG	4	23	488	515
W9FAM	27	30	456	513
W6ETJ	229	75	207	511
W5WW	32	23	456	511
W7ACH	52	47	410	509
W9HCB	50	21	432	503
W3NF	58	71	372	501
W8BMX	190	102	206	498
W9BN	54	101	336	491
W1BEU	88	109	208	405
W3CXM	42	117	225	384
W6CEN	196	112	76	384
W9NP	11	288	76	375
W2ADQ	106	206	52	364
W8FX	12	212	90	314
W6FEY	133	146	2	281
W6YAU	92	159	14	265
W6CZW	18	114	116	248
W7TX	35	116	54	205
W7ANP	21	109	34	164
W5HY	25	102	20	147

Month of December 16th-January 15th. Note the stations responsible for above one hundred deliveries. Deliveries count!

A total of 500 or more bona fide messages handled and counted in accordance with A.R.R.L. practice, or just 100 or more deliveries will put you in line for a place in the B.P.L. Why not make more schedules with the reliable stations you hear and take steps to handle the traffic that will qualify you for B.P.L. membership also?

Official Broadcasting Stations

(CHANGES AND ADDITIONS)

(Local Standard Time)

W1APK	1900 kc. (phone & CW) Daily, 7:00 p.m.
W3QP	1725 kc. Tues., Fri., 9:00 p.m.
	7260 kc. Tues., Fri., 9:15 p.m.
K4RK	7054 kc. Tues., Sat., 11:30 a.m.
W6DSP	3509 kc. (phone) Tues., Thurs., 7:00 p.m.
W7AVM	7140 kc. Sun., 12:00 Noon.
W8DED	3800 kc. Sun., 1:00 p.m.; Sat., 4:00 p.m.; Wed., 6:30 p.m.; Sat., 5:30 p.m.
W8CSW	1925 kc. Wed., 8:00 p.m. Directly after code practice transmission.
W8UP	1830 kc. (phone) Daily 11:00 p.m.
W9EKM	3790 kc. Tues., Thurs., Sat., 7:30 p.m.
W9GAI	3637 kc. Wed., Sat., 8:00 p.m.
	7274 kc. Wed., Sat., 8:00 p.m.

TWO-BAND QSO PARTY REPORTS

Those who wrote us regarding their participation in the Two-Band QSO Party of November 21st, which was announced in November 1931 QST, report a new "thrill" in inter-band contacts, and regret only that more stations were not on for the fun. Amateurs with transmitters on 7 mc. were to listen for and work amateurs on 3.5 mc., and those on 3.5 mc. were to listen on 7 mc. and transmit on 3.5 mc. W1APJ worked K4RK at 10:25 p.m., November 21st, his station on 3.5 mc. and K4RK on 7 mc. K4RK reported W1APJ QSA3 R4, and W1APJ returned a report on QSA5 R6. W5ANU says, "Very gratifying results here. Of all the stations called, only one was not hooked." W3MG, with transmitter on 3.5-mc. band and receiver on 7 mc., worked W8CKP, W3ASJ, W2BPY, W8CAF, W2COK and W5BPM. W9TE writes: "The two-band QSO party was fb. However, most of the fellows I worked said they had trouble due to lack of stations." W9GCX-BIM says, "The party was enjoyed very much at this station. Was successful during afternoon and early evening. Contacted four states." Other stations reporting work during the party are W1CTI, W8ABH and W6ADK.

IS YOUR CALL IN THE TELEPHONE BOOK?

Have you ever gone into a strange city and tried to locate a "ham" by his call? Wouldn't it be nice if the call letters were listed in the telephone directory, giving address and telephone number? This thought occurred to W9CNE after unsuccessfully attempting to locate "hams" upon several occasions. The Southern Bell Telephone Company was approached with a plan to list the amateur call letters in the alphabetical section of the telephone directory.

The Southern Bell officials realized the value of these stations to the community and to the nation at large, especially in times of emergency, and readily assented to listing amateur calls in the alphabetical section of their directories. In order to distinguish amateur stations and other stations often given directory listings the following form was suggested:

Radio W9CNE (Amateur), r 3718 Rudd, Shawnee 5780

Upon presentation to the local amateur stations, the plan for directory listings met with unqualified approval, and at this time thirty-five Louisville (Kentucky) amateurs have requested this service. This listing was secured for a very reasonable charge. Undoubtedly, these listings will be of immeasurable value to the amateur himself, as they will not only assist "out-of-towners" to locate him, but will put local telephone numbers of other "hams" at his finger tips.

The Louisville amateurs feel that now is the time to discard the "shrinking violet" policy of the average amateur in the past and that these listings will tend to bring the radio amateurs up to their rightful position in the estimation of the public.

DIVISIONAL REPORTS

ATLANTIC DIVISION

SOUTHERN NEW JERSEY — SCM, Robert Adams, 3rd. W3SM — A total of thirty-five stations reported this month, of which thirty-two handled traffic. This is by far the best showing to date. I would like to see each station handling a larger volume of traffic. W3UT and W3PG had nice totals. W3BFH built a new transmitter. W3ASG and W3ZI are active in Army Amateur work. W3BSC is rebuilding as are W3SY, W3CEU, W3BBD, W3BEI, W3ACJ, W3AWV and W3APM. W3ARY is looking for new schedules. W3AEJ is doing good work on 3.5 mc. W3BPD and W3NK are keeping Salem County on the map. W3QL handled his usual fine volume of traffic. W3ZX and W3BMC were appointed Official Observers. W3ASU and W3ADL are temporarily off the air. W3ABQ had a fire in his shack. W3APN installed a new one-kilowatt tube. W3BPT sent in his first report. W3ACJ and W3BPD were appointed O.R.S. The Radio Association of Southern New Jersey elected W3BAY as its new President, and W3JZ, "The Connecticut Yankee," presented his talk on the "Mikotron" at the last

meeting. W3BUB is now located in Oaklyn. W3SM has been putting the finishing touches on his new 'phone outfit.

Traffic: W3BPT 26, W3ARN 18, W3BAQ 10, W3AWV 3, W3ACJ 1, W3BEI 13, W3AUI 8, W3BO 18, W3ZI 83, W3BBD 52, W3QL 151, W3BPD 4, W3NK 12, W3AEJ 29, W3ARV 36, W3AKF 22, W3BSC 24, W3ASG 22, W3BFH 14, W3SM 44, W3CCT 2, W3PC 43, W3BLR 24, W3APN 78, W3ATV 3, W3BUZ 6, W3ACX 2, W3ATL 8, W3UT 97, W3JL 36, W3ATA 13, W3KW 22.

WESTERN PENNSYLVANIA — SCM, R. M. Lloyd, W8CFR — W8CUG is the first station in the section to make the BPL since the new requirements became effective. W8DLG walked away with the monthly prize of three log books; his deliveries totaled 81. W8EDG reported by radio. W8YA complains of the skip on 3.5 mc. W8DVA is working on antennae. W8CMP attended the A.T.A. annual banquet in Pittsburgh. W8AJU blew his 50-watter. W8CAX was home for the holidays. W8DGW's new receiver is perking. W8BUC has an MOPA now. W8KD blew his power transformer. W8BPW was elected President of the E.A.R.C. W8FKU turned in his first report. W8CEO is on the air regularly. W8BSO sold his '45s. W8BKS 'phoned his report. W8FAD is on 7 mc. now. W8DRO joined the U.S.N.R. W8CQA is building a new receiver. W8DYL's new transmitter is progressing. There is going to be a new MOPA at W8EJK soon. W8LX has a new power supply. W8AYH is troubled by a power leak. W8EYZ is on with a new crystal outfit. W8BEC comes through with a first report. W8DVZ is back on the air after many months' absence. W8APQ says "If it isn't spring fever, it's the Grippe!" that keeps his total down. He is helping W8EIM with a new transmitter. W8FGY is a new station in Pittsburgh. W8AVV does nothing but sleep. W8ECH reports a new receiver. W8BFZ likes Ping-Pong. W8CAF and W8DDU are on 7 mc. W8CFR had to buy more batteries because the guy with the high total borrowed his batteries!

Traffic: W8CUG 515, W8DLG 425, W8EDG 160, W8YA 136, W8DVA 107, W8CMP 77, W8AJU 75, W8CAX 62, W8DGW 54, W8BUC 39, W8KD 37, W8FKU 33, W8CEO 21, W8BSO 17, W8BKS 13, W8FAD 13, W8DRO 12, W8CQA 10, W8EJK 10, W8AYH 11, W8LX 8, W8EYZ 7, W8BEC 5, W8CFR 7, W8DVZ 4, W8APQ 3, W8FGY 3, W8AVV 2, W8ECH 2.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Harry Ginsberg, W3NY — I extend hearty thanks to all of you who reported, for your splendid work, and for the excellent cooperation by reporting. Twenty-eight out of thirty ORS reported; as did also 5 non-ORS. The Washington Radio Club has elected W3BEG President, W3IL Vice-President, W3CDQ Secretary, and W3LX Treasurer. Plans are under way to increase meeting attendance. Let's give 'em our fullest cooperation, gang. W3BBW reports a strictly daylight net from Boston down the East Coast to Los Angeles. Maryland: W3AOO leads the Md. gang. W3HT is building a pentode receiver. W3BBW is hitting his old stride. W3SN is building a powerful receiver. W3BOE helped to QSP three foreign messages. W3BGI is working on a pentode receiver. W3BND has a new T.P.T.G. P.P. rig. W3CDG is having trouble with his 'phone. W3AFF and his local gang are in love. Hi. W3BEG moved the rig to better quarters. W3AVD is member of National Guard. W3AMI has a new Dynatron oscillator. W3BKC visited the N.Y.C. gang. W3AHG is building a P.P. receiver. W3LA is busy with television. W3BCS has a T.P.T.G. rig perking. W3DG is going in for 56-mc. 'phone. W3ZK has started on new frequency measuring equipment. W3NY is experimenting with rectifiers and filters. District of Columbia: W3CXL again leads the Section with a bigger total. W3BWT is building a 'phone rig. Hi! Hi! W3ASO is rebuilding to a crystal job. W3PN is very QRL with work. W3OZ finally got his new transmitter and receiver working. W3CAB reports with a FB 'photo of the rig and himself. W3CDQ is going strong. W3PM has a 50-watt crystal rig perking. W3IL moved to warmer quarters. Delaware: W3HC is building an MOPA. W3BAK is going along nicely. W3AJH is QRL with moving a broadcast station. W3ALQ has been visiting.

Traffic: W3CXL 1472, W3BWT 921, W3ASO 279, W3AOO 212, W3HT 110, W3BBW 105, W3HC 49, W3SN

37. W3BOE 30, W3BGI 17, W3BND 12, W3PN 12, W3BAK 12, W3OZ 12, W3CDG 11, W3AFF 10, W3BEG 7, W3CAB 7, W3AJH 4, W3CDQ 3, W3ALQ 3, W3AVD 2, W3NY 2.

EASTERN PENNSYLVANIA—SCM, Jack Wagen-seller, W3GS—Things in general are better this month. Most individual totals are higher than usual. We must have EVERYBODY report EVERY month. At last the tide has changed and W3NF wins the monthly prize and makes the BPL. Our other RM, W3MC, runs a close second. W3ATN grabs third place. Eleven schedules are responsible for W3OK's FB total. W3AHD is now an ORS. W3UX let his ORS expire. W3AKB is going to try DX for a change. W8FCB was off for two weeks due to an accident. Skip distance knocked W3MG's schedules. The YLs left W3AAD alone long enough for him to send in a nice report. W3BET was off air for one month due to haywire receiver. W3BES says Christmas traffic helped his report. Chester Radio Club, W3BKQ, held a hamfest. W8CFI was pounding back home at W9EWV during Christmas vacation. W3HH reports for first time. W8CVS was busy with W-VE contest. W3BRH leaves DX alone long enough to handle a few. W3BBK has been off the air due to station license expiration. W3DZ handled quite a bit of Christmas traffic. W3ZF is rebuilding his transmitter. W3UB has been working 'phone. W3BBK spent most of his time on DX. W8VD has been in a radio slump. W3AQN reports DX great. W3ANZ says new SW3 receiver perking FB. He also reports for W3AAO. W3EO handled all his on 7 mc. Reports were received from both W3ANK and W3BNK. They must be related. W3BCD, W3AGV, W3CBK, W3CDJ, W3BUH, and W3BEY all report for the first time. W3BTP can't get enough traffic. W8CWO has changed to 7 and 14 mc. W8DPQ is building a MOPA. W3QP is changing his 3700-ke. Official Broad-cast to 1770 kc. to overcome skip. W3BOL now has a new QRA. W3BVX is now an OO. No one that W8EU QSOs seems to have any traffic. The ORS appointments of W8-DHT and W8AWO have been put in cold storage due to school QRM. W3AQQ's ORS appointment has been cancelled. We are going to clean out all dead wood. If you are interested in holding your ORS appointment, show us so in your reports. The first issue of *The Atlantic Division Ham News* appeared January 22nd. It was formerly *The Eastern Pennsylvania Ham News*, but it has now increased to a circulation of 3000 copies sent free each month to every amateur in the Atlantic Division. We are not only going to put our Section on top but the whole Atlantic Division.

Traffic: W3NF 501, W3MC 282, W3ATN 273, W3OK 257, W3AHD 215, W3UX 206, W3AKB 201, W8FCB 173, W3MG 132, W3AAD 119, W3BET 104, W3BES 90, W3BKQ 87, W8CFI 76, W3HH 75, W8CVS 71, W3BRH 66, W3BBK 65, W3DZ 65, W3ZF 64, W3UB 55, W3EV 44, W8VD 39, W3AQN 36, W3ANZ 34, W3EO 30, W3ANK 28, W3BCD 27, W3AAO 20, W3AGV 19, W3BTP 19, W3BUH 17, W3BEY 17, W3CBK 16, W8CWO 14, W3BNK 13, W3CDJ 10, W8DPQ 10, W3QP 10, W3BOL 8, W3BVX 3, W8EU 2.

WESTERN NEW YORK—SCM, Don Farrell, W8-DSP—Well, fellows, our Section leads the Atlantic Division in traffic handled. Let's put the Division in first place. W8ETH reports considerable activity in the northern part of the state. The north country gang held a hamfest at Ogdensburg which was well attended. W8EWC and W8BLO are new hams in Angola. W8AKX, another newcomer, sends in his first report. W8CSW is doing nice work with his 1750-ke. 'phone. W8QL is handling a bunch of traffic. The following stations send in their traffic report by radio—W8QL, W8DSS, W8BWY and W8JW. W8DSS turns in a fine traffic total. W8BWY spends most of his time handling traffic. W8DBX makes the BPL and leads the Section. W8DES has a nice traffic total. W8DHU worked the west coast on 3.5 mc. The SCM manages to keep a few schedules. W8CPC worked Costa Rica on 'phone. W8DCX reports working a bunch of DX. W8DII reports through his schedule with W8DSS. W8EUY has a new push-pull using '03A tubes. W8DSA has his new crystal rig going FB. W8BR added a type '10 amplifier to his MOPA. W8CMH is experimenting on 56 mc. W8DEJ worked two 6's with the new crystal outfit. "FB, Marge." W8BLP worked Europe 17

days in the month of December and QSOed 46 different stations. W8AFY worked K5AA on 7 mc. W8AFM has a 56-mc. job on the air. W8BFG is still on 14 mc. W8BJI worked Panama. W8BGN is running tests on antenna and keying systems. W8BEN is back on the air with 52's in push-pull. W8AGS is rebuilding his AC receiver. W8DXF is showing the gang in Lockport how to handle traffic. W8DHQ built Chinn's super converter. W8DEQ keeps a schedule with Oneida. W8BHK is very QRL with his new BCL store. W8ABX has '03As in push-pull. W8OB worked K5AA on 14 mc. W8AYU works all bands with his new crystal rig. W8BFF says the gang in Elmira is having trouble with the SWLs. "Hi." W8DQP is putting up a new 50-foot mast. W8DMJ reports traffic. W8CYG is going strong again. W8CJJ sends in his first traffic report. W8ECM wants ORS. W8AOR wants schedules with Canadian stations. W8JV is a new traffic man. W8BUP is back on the air. W8CIL reports a new club in Sherman. W8CNX blew two new '03As. W8AOW is building a new push-pull with '03As. The Syracuse Club is having some good talks by its members. The SCM will appreciate it if all ORS will send in their monthly reports promptly on the 16th of each month. W8DME is using remote control so he can have a warm operating room. W8BDK reports the Gloversville Club now affiliated with A.R.R.L. W8EWT sure is putting Lockport on the map. W8AWM reports as President of the Jamestown Club. W8AJ is rebuilding to crystal.

Traffic: W8DBX 782, W8DSS 486, W8AGS 416, W8DES 306, W8QL 298, W8DHU 225, W8DSP 133, W8DXF 120, W8BWY 95, W8DHQ 58, W8CSW 38, W8CPC 31, W8DCX 29, W8DII 28, W8EUY 28, W8DSA 21, W8DEQ 15, W8BR 11, W8CMH 11, W8DEJ 11, W8BLP 10, W8BHK 8, W8ABX 8, W8AFY 5, W8AYU 5, W8AFM 4, W8BFG 4, W8BJI 3, W8QB 2, W8BDK 26, W8DME 24, W8AJ 9, W8BFF 118, W8DQP 77, W8DMJ 55, W8CYG 41, W8CJJ 35, W8ECM 24, W8AOR 19, W8JV 15, W8BUP 15, W8JW 15, W8EWT 178, W8ON 108, W8AED 28.

CENTRAL DIVISION

KENTUCKY—SCM, J. B. Wathen, III, W9BAZ—Boys, you sure did it! Those December 15th reports gave Kentucky the Traffic Banner. Whoopee! W9LH has the fine habit of being high man. W9JL is building a 3.5-mc. crystal job. W9OX was national leader in A.L.N. competition, rating 100%. W9BAZ attended the Central Division SCM meeting held in Ft. Wayne, Ind., January 23rd-24th. W9QT is putting in mercury arc. W9CNE says, "Piddling with phone." We welcome to our ranks W9CRJ. W9AUH made New Year's resolution to report every month. W9EDQ has rebuilt receiver. W9BAN reports activity improving in Western Kentucky. W9ARU and W5BXA are trying to marry a Louisville YL to a Gulfport OM via radio—the Cupid Special. W9BWJ gets a little time for brass-pounding. W9CWZ is changing to permit CW on 3.5 mc. W9EQO's two pupils are to take their exams at next appearance of the RI. Circumstances forced W9ABV to get a new '10. Activity is light at W9DDQ. W9FZV expects to have more time for radio soon. W9FRF is changing to permit operation of CW on 7 and 3.5 mc. W9GYC took unto himself an OW on December 12th—many happy returns. Hi. W9BEW promises better activity. W9HCO is now on staff of WHAS. W9CDA expects to be entirely rebuilt by International Tests. W9VB was forced to rebuild transmitter. A new antenna graces W9EDV's premises. W9EYW is on the air once more. W9BBO moved back to the west end. W9ERH has finished building transmitters for the National Guard. Whether you are a traffic man or not, let's hear from you.

Traffic: W9LH 638, W9JL 122, W9OX 40, W9QT 32, W9BAZ 30, W9CNE 25, W9CRJ 18, W9AUH 15, W9EDQ 15, W9BAN 14, W9ARU 13, W9BWJ 9, W9CWZ 9, W9EQO 7, W9ABV 5, W9DDQ 3, W9FZV 3, W9GYC 3, W9BEW 2, W9HCO 2.

INDIANA—SCM, George H. Graue, W9BKJ—The axe is going to fall on some dead timber if reports don't come in regularly. W9FUT is the banner traffic station this month. W9TE is laying in a supply of crystals. W9EJ is a new station in Hobart. Old 9AWZ is waiting for the

FRC to send new call. W9DHJ just renewed his ticket for the 10th time. W9UM is back again with his DX schedules. W9AKJ has been appointed OO. Ex W3BSL is now W9EJB at Elkhart. W9FHB's crystal won't stay put. W9AEB is now crystal-controlled. W9FAK wants to join the ORS family. W9EXL has a 56-mc. receiver. W9GJS reports having heard 65 countries on 7 mc. W9HUO and W9GLF have applied for ORS. W9FIY and W9CAD are new ham in Indianapolis. W9FKI is putting in a MG set. W9AXJ has a Scott all-wave receiver. W9BXT has applied for ORS. W9AIP has a 75-watt rig in the making. W9GGJ has discarded the crystal rig and gone back to the antique. W9AXK is a new station in Frankfort. W9ELX is trying out a mercury are rectifier. W9HTX's ambition is to master a bug. W9DNQ has an MOPA on the air. W9FAX is a new ham in Irvington. W9ABW is QRL night work. W9AIP is building a new rig for W9EGE. W9AB is giving code practice on 1900 kc. W9LG is moving 'phone rig to Mishawaka High School. W9GOE is making up a CW rig. W9HJG is changing QRA, ditto for W9CHA. W9GJS is leaving for a comm. job. W9GYB has portable W9FDY. W9EZR is having trouble with youpi signs. W9FRY has moved to Tennessee. W9EWQ is going to 'phone. W9EPH will be off until he gets his comm. rig. W9BZZ is working on a crystal. W9BHM is back after three months of rebuilding. W9BWI is making changes in the television rig.

Traffic: W9FUT 889, W9TE 163, W9DHJ 151, W9UM 72, W9CKY 64, W9AKJ 61, W9FHB 51, W9FAK 38, W9QG 25, W9EXL 22, W9GJS 19, W9HUO 18, W9FKE 17, W9FKI 14, W9BDE 12, W9AXH 9, W9BXT 7, W9GOE 6, W9CWE 4, W9HJG 4, W9AIP 4, W9GGJ 4, W9ABW 2, W9EGE 2, W9DJU 16, W9BKJ 11, W9AET 12, W9CKG 34, W9AB 6.

OHIO — SCM, Harry A. Tummonds, W8BAH — Wire your weather man, gang, and let's have some good radio weather. The BPL list this month: W8DDS, W8DFR, W8BMX and W8BAH. We are proud of our General Ohio Route Manager, W8DDS. His work has been consistent and he is always on the air. District No. 1: RM W8DVL is on for schedules daily. W8BNC has to take it easy. W8BMX is now President of the Garfield Radio Club. Traffic scarce reports W8CIY. Look at the date on your ORS certificate. Are you still an ORS? If not, better have it renewed pronto. "Working on W8CRB for ORS," says W8RN. W8FRR and W8CRB are new Cleveland reporters. W8DYG reports new hams W8EPW and W8FRR. Back at Jamestown for a week, reports W8BYD. W8EQU won traffic contest at the Garfield Club. Busy on 7 and 3.5 mc., reports W8EEW. W8EXA sure has a novel QSL card. W8BOT is working nights again. W8FF has nice total. W8AXV has his new '04A going now. W8UC wants ORS. W8EBT was at W8DDS for two weeks, at W8EBT ten days. W8AGF wants schedules on 7 mc. W8AKY has power leak. W8ENJ sends letter from Sandusky. W8FQQ is new ham, reports W8CCK. "Have worked 160 stations," reports W8FJE. "Want a VK but a ZL will do," says W8EFW. Looking for new club rooms, reports LRC, W8EGO. Nice report from W8TH. New Hartley and 50-watter on 7175, reports W8CPS. My fist finally went haywire, reports W8BON. Waiting two months for station license, reports W8EBY. W8CIO says busy, and how! "Using same 'B' supply as BCL set, so don't get on till folks go to bed," reports W8FOR. W8BFT will be an ORS soon. W8DHP says no luck yet on 1750 kc. District No. 2: Crystal soon at W8BCI. RM W8BKM reports good results on 1750 kc. Nice report from W8EJ. District No. 3: "Trying to line up schedules," reports W8CSB. W8AND is QRL new job. RM W8APC is using crystal on 3900 kc. W8BTT reports. District No. 4: How about ORS, W8DTW? W8HT is now on 3600 kc. We welcome the new RM in this district, W8EEQ of Findlay. W8ATV and W8QO report. "Too many on 3.5 mc. in town to do much," reports W8QO. W8AFU is new reporter from Shelby. "Back home again for awhile," reports W8UW. "Busy," reports W8QC. District No. 5: RM W8DFR is a busy man. He is starting the Stark Radio Amateur Assn. W8DVE is a hard worker. W8BMK is a new reporter from Akron. Another report from W8EXI. Watch for W8BZL at new ONG Set using call W8BLS. "Not one darn thing to report except trouble," says

W8EFN. New rig at W8NP. District No. 6: "What is formula for DX?," asks W8CXF. 50-watt CW at W8ARW now. Report from W8GZ by special delivery. W8BBH will be back for schedules soon. W8CBL is new reporter from Columbus. District No. 7: RM W8CKX has crystal rig working. W8VP is on 7 mc. We welcome W8ANS, new reporter from Bellaire. District No. 8: RM W8CGS finished rebuilding. Using 3080 low-power crystal rig now at W8ENH. Radio conditions absolutely rotten at Cincinnati, reports W8ALQ. New Motor Generator outfit at W8FA. District No. 9: W8TK is now keeping regular schedules. We want reports from W8CDW Mt. Sterling. W8ANZ just got back on 3.5 mc. By the time you read this, hope you can hear new crystal signals on 3750 kc. throughout the state from W8BAH. Ohio RMs have promised that Ohio will shortly have the most efficient border and inland communication net works in any A.R.R.L. Section. These nets will daily contact all important cities and towns. Let's climb back up to the top where we belong, gang. Thanks for the 74 reports this month.

Traffic: W8DDS 2317, W8BAH 670, W8DFR 620, W8BMX 498, W8BYD 309, W8DVE 231, W8FF 241, W8BON 229, W8DVL 205, W8CIO 172, W8EQU 189, W8EXA 162, W8CRB 161, W8CKX 142, W8BNC 128, W8EBT 127, W8RN 127, W8BKM 120, W8APC 109, W8EEQ 108, W8BYG 92, W8ANS 72, W8BOT 72, W8GZ 57, W8ENJ 56, W8TK 53, W8EBY 48, W8DTW 48, W8EDY 48, W8VP 38, W8CUL 38, W8BZL 35, W8BMK 32, W8BTT 31, W8EEW 30, W8FFM 28, W8ATV 24, W8FRR 23, W8CXF 22, W8ALQ 22, W8NP 22, W8CCK 21, W8FA 20, W8CBL 18, W8ARW 17, W8EJ 17, W8AND 16, W8AXV 16, W8AGF 15, W8ENH 14, W8CGS 14, W8HT 13, W8BFT 12, W8QO 12, W8TH 12, W8EXI 12, W8FOR 12, W8CIY 12, W8UC 10, W8CPS 10, W8AKY 10, W8CSB 9, W8FJE 9, W8BCI 8, W8AFU 7, W8BBH 5, W8DHP 4, W8EFW 4, W8QO 3, W8ANZ 1, W8DGO 1.

ILLINOIS — SCM, F. J. Hinds, W9APY — RM E. A. Hubbell, W9ERU — Good work, OMs! This is the best traffic month Illinois has ever had. Every one of you keep up the good work and handle more messages per station. Get all stations handling any traffic to report it. W9CZ has been elected the first president of the new Emerson House Amateur Radio Club in Chicago. W9BNR is back on the air. W9EAL is experimenting with low-power 'phone. W9CNY is working on all amateur bands. The license at W9ALA expired. W9BPV received his first class ticket. W9HVO has been experimenting with low power. W9CKM built a push-pull transmitter to conquer skip distance. W9GST sends in his first traffic report. W9GEP is making a new receiver. W9GYR is making a new Hartley. W9CTU is on 3500 only. W9VH has two transmitters going on 3500 simultaneously. W9FRA is taking a traffic rest. Hi. W9NN is building a crystal rig. W9FI is getting ready for the International tests. W9GUFU is now an OO. W9BBR heard 'phone signals from 2AOK in Cheltenham, England, on a one-tube receiver on 3500 band. W9DZG just returned from Mexico. W9DOU will build up the totals when the weather improves. Receiver trouble at W9HFK. A bad power leak has stopped operations at W9BIR. W9ATS was off due to his 65-foot tower blowing down. W9KA is installing a crystal. W9AYO is grinding a crystal. W9GSC has taken a wife and is now W8FOV. Skip distance effects have played havoc with schedules of W9AMO. W9PK is back on with a self-excited outfit. W9EHG uses a '10 TNT. W9AVB is on 1750 kc. W9GIV is rebuilding into crystal control. W9FCW and W9APY have skip troubles, too. W9OQ is a newcomer doing fine traffic work. W9GAI is out for a commercial ticket. W9CUH is using a Zepp again. W9HSG will soon be an ORS. W9FDQ has a 'phone on once in a while. W9BRX now uses an RF coupled receiver per December QST. W9FXE says he hardly had time to eat this month due to traffic. W9ACU has been on the sick list, but did splendid traffic work just the same. W9BYZ is installing a crystal. W9AFN has the portable call W9FOI. W9AFN received a public service certificate for contacts with "WDE." W9DJG has a portable low power using the call W9FHD. W9BYL has a 'phone on 1944 kc. W9GDM is building a new crystal set. W9CTP takes the honors this month for leading in traffic totals. W9EBL is a newcomer doing fine traffic

work. W9CEO will soon be an ORS. The highest tower at W9CZL was blown down in a hard windstorm. W9HPK is doing fine traffic work. W9KX uses a split coil Hartley. W9EQW has a new '10 push-pull. W9AWF will soon have a 50-watter going. W9JO has been busy building a transmitter for W9HBX. W9HUX will soon be an ORS. W9DBO is another new reporting station. W9HNK and W9FAU are out for ORS. W9HCB and W9GPJ are reporting excellent totals for their first reports. W9HCB uses two '50s in a push-pull TNT. W9GPJ has a new Zepp. W9AFB has a new power supply. W9ACE says: "When I am President there won't be any more schools — can find little time for Radio." W9CPQ is a new Chicago reporter. He reports W9CHT at the Hyde Park High School, with W9GPJ, a newcomer, Johnny Heineck, and himself will do the operating. W9AAO-ANQ, President of the Waukegan Radio Club, sends in lots of news as follows: W9AE will be on with 3.5-mc. 'phone as soon as he obtains his new operator's license. W9AAV and W9BLV are now on with two '45s in PP. W9ANQ is building a crystal rig. W9BBR was heard in England on 3.5-mc. 'phone. W9BJH is waiting for new license. W9CGW reports traffic. W9CNQ is on 14 and 7 mc. CW. W9DEU is trying hard to get on the air. W9DNK is using a '45 in Hartley. W9ETU is a newcomer. W9GTI blew his '81s. W9GYK has the best 'phone in northern Illinois and is studying code to pass extra first. W9EGY is building a low power PP rig. W9EPU wants to know how to make an antenna stay put. (His has come down four times.) W9GIG blew an 800-watt transformer.

Traffic: W9CTP 2425, W9AFN 1161, W9CYT 736, W9GAI 869, W9FXE 730, W9ACU 700, W9FUE 695, W9FAI 602, W9FO 500, W9HCB 503, W9FRA 433, W9QI 349, W9ERU 325, W9FI 293, W9GPJ 277, W9BPU 255, W9EKM 205, W9ALA 202, W9VS 181, W9AMO 173, W9HFK 158, W9BVP 157, W9ATS 156, W9PK 151, W9CGV 138, W9HSG 133, W9AYO 131, W9GDM 123, W9APY 114, W9BRX 113, W9FYZ 111, W9FCW 109, W9GSF 89, W9VH 76, W9CKM 75, W9WJ 73, W9CTU 68, W9DYG 66, W9GYO 66, W9GFU 62, W9AIC 57, W9BTU 57, W9CEO 53, W9AD 52, W9CPQ 46, W9OQ 38, W9EHG 37, W9BYL 35, W9HNK 33, W9AFB 30, W9DOU 30, W9CZL 28, W9DJG 28, W9CFV 27, W9EHZ 30, W9BYZ 26, W9FTX 27, W9DZU 24, W9BBR 21, W9CUH 21, W9JO 20, W9GDI 14, W9GEP 14, W9FOI 19, W9ACE 13, W9FDQ 12, W9NN 12, W9EBL 11, W9EJO 11, W9HPK 11, W9EWV 8, W9HUX 8, W9AVB 7, W9DZG 7, W9EQW 6, W9BIR 4, W9GIV 4, W9AWF 3, W9DBO 3, W9CGW 3, W9BXL 1, W9FPN 1, W9CK 1.

WISCONSIN — SCM, C. N. Crapo, W9VD — W9EHD takes all honors this month with 255 messages. W9FAV is kept pretty busy routing the BARC up and down the Fox River valley. W9FSS is studying Morse at home. W9DKH is working on 1750-ke. 'phone. W9EBO has installed new filter. W9GFL has been off the air a few weeks getting the 852 working. W9ZY is putting 190 watts crystal into antenna. W9FAA has a splendid crystal note on 3700 ke. W9EYH operates mostly on 14,000 ke. W9GVL says BCL trouble gone and everybody is happy. W9ASQ is building a new power supply. W9FAW is experimenting. W9BXZ is on 7000. W9BJF-W9BQM are putting 150 watts into antenna on 3653-ke. crystal. W9COG is on regularly. W9EOX will have crystal when his license renewal is returned. W9DJQ has been trying out 1750-ke. band. W9BIB made 85 points in AA Contest. W9GPQ schedules W9BU, W9AN, W9FAA and W9EPJ on 3849 ke. W9EGP says Badger News FB. W9ESZ is on 3900-ke. crystal regularly. W9HFH got his first "5" card recently. W9FAF is a new station at Racine. W9CFP applies for ORS. W9DLQ has new crystal job finished. W9DND is now CC. W9EOB is putting in 50-watt crystal set soon. W9DRO has new TPTG PP outfit. W9ASL is on occasionally. W9HMS is having trouble getting new receiver to perk properly. W9SO has two new ops. W3AWS and W8AEQ. W9EAR says Beaver Dam now has four other hams, W9DQG, W9AER, W9HDT and W9EAR. W9FVG has '10 in TNT on 3800 ke. W9DYU (Ex W9AWZ) has '01a in TNT. W9DNB is fooling around on 14,000. W9BWV got a "heard" card from an Aussie. W9GGH is CC with 50 watts in final stage. W9BIO and W9ELQ are two new hams

in Kenosha. W9AVG received merit certificate for handling Byrd Expedition traffic. W9ANJ reports via W9ZY. W9AHJ has '10s in PP. W9HFL is working on new rig with two '10s. W9HTZ has worked over 400 stations in two months with two '45s. W9HNC is having trouble with his PP job. W9BXZ is new call of M. F. Whittan at Burlington. W9AN has schedules with W9BN and W9GPQ. W9VD has 3500-ke. crystal and will be on soon with '52 in final amplifier.

Traffic: W9EHD 255, W9FAV 208, W9FSS 148, W9DKH 129, W9GFL 123, W9ZY 108, W9FAA 101, W9EYH 84, W9GVL 46, W9ASQ 37, W9FAW 36, W9BXZ 35, W9BJF-BQM 30, W9COG 33, W9EOX 23, W9BIB 20, W9GPQ 19, W9EGP 12, W9ESZ 10, W9FAF 9, W9CFP 8, W9DLQ 8, W9EOB 5, W9ANJ 8, W9DRO 4, W9ASL 4, W9HMS 3, W9SO 3, W9DND 6, W9HFH 9, W9EBO 126, W9DJQ 20, W9VD 24, W9AN 49.

MICHIGAN — SCM, Ralph J. Stephenson, W8DMS — Again W8PP is high man for Michigan! W8FX makes the BPL on a lotta deliveries. 76 stations reporting traffic this month. FB. 17 reports from northern part of state! W9HK was a Detroit visitor recently. W9GQS reports W9EEM new Calumet station. W9YX is on with 'phone. W8EGI is QRL school work. W9VL reports for Gladstone gang. W9BBP QRX license. W9DYH let his station ticket expire while attending Boston Tech. W9DCN will be heard from soon. W8DM helped the Kalamazoo gang with traffic. W9FBC is working 1.7- and 3.5-mc. bands. W8AYO is new ORS. W8AKN is also after one. W8GP and W8BQN get O.O. appointments. W9EGF looks out for Larium traffic. W9AXE is off temporarily. W9EXT is doing his share. W9HIS is getting started right. W8EKZ is trying for BPL. W8CFZ is in line for ORS. W8KY handles plenty of army test reports. W8BJ says poor QRA has him stopped. W8CJZ was afraid to report under new system of scoring for banner. We need 'em all, and if no traffic, let's have a report anyway. W9CSI reports through W9HK. W8BGY is our active Lansing station. W8PP is going to revamp the equipment. W8BMG surely holds up his end on traffic. W8EGN reports via the R.M. W8BXJ is coaching three new ops. W8DFE is QRL school and "job." W8JX is all set to go now that power QRM QRT. W8DOV is grinding crystals. W8DCT and W8IL are trying to get A.A. nets perking. W8ARR can be heard almost any time on 3.5 mc. W8CEU promises bigger totals next month. W8AM is heard plenty now. W8DED reports for Holland crowd. W8FRI promises more next month. W8AM's receiver picks up nothing but D.X. W8EAE is deserting traffic for his 'phone. W8HSQ kept schedules with W9BTN (boy scout camp) for four days. FB. W8AUT reports five stations in Owosso. W8CPH is keeping good schedules on west side of state. W8DZ still has time for some traffic. W8AW-DXS keep their set busy with hot schedules. W8QT reports for first time. W8DFS reports skip interfering with his schedules. W8BTK is on with entire new layout. W8AJG reports for second consecutive month. W8BIU is looking for ORS. W9CWR is active in North Michigan net, and reports W9HNJ, W9CUC, W9EMB and W9ADV all active in Ironwood. W9CE nearly lost his ORS ticket when Mrs. W9HK thought it was a worthless student certificate and threw it in the fire. W9DGF is new station in Ishpeming. W9EXT reports W9DRK, Hancock and W9DDK in Ripley new hams. W8PQ finally installed a filter. W8FX says he has realized his ambition in making BPL. W9FPF is rebuilding. W8MV split up, with new station in Royal Oak and old QRA using call W8AIU. W9GJX is QRL work and school. Three Detroit nets in operation now, with W8DYH in charge No. 1, W8AKN No. 2, and W8FX No. 3. The D.A.R.A. is putting out a bulletin with Michigan news, etc., and if you don't get a copy, it's because you haven't reported. It's only mailed to reporting stations. MIM. Ask the RM or SCM for report cards or shoot in a message on the 16th. Reports from W8AKN, W8BGA, W8JD, W8WO, W8DXY, W8EVC, W8BRS and W8NR just got under the wire. W8CKQ and W8EBN report a hamfest at Benton Harbor with about 25 hams from surrounding towns present at the shack of W8CKQ. W8GG and W8EBN gave talks. W8CUE and W8FIO are making arrangements for another meeting.

Traffic: W8PP 2105, W8BMG 904, W9HK 677, W8DYH 427, W9VL 397, W8AW 370, W8DED 332, W8FX 314, W8KY 296, W8AM 278, W8DFS 259, W9CE 229, W8EKZ 198, W8BMZ 180, W8EGI 171, W8PQ 151, W8BGY 138, W8EGF 138, W8BNJ 117, W8CST 115, W8CFZ 101, W9CWR 100, W8BTK 100, W9GJX 92, W8DFE 84, W8BIU 79, W8DMS 69, W8ARR 66, W9BBP 63, W8CPH 58, W8QT 57, W8AJG 56, W9EXT 54, W9BTN 52, W8JN 42, W9HSQ 39, W9GQS 39, W8CJZ 38, W9DAB 32, W8CEU 31, W9FBC 31, W8CWK 30, W9CSI 30, W8DCT 41, W8EGX 27, W8RF 24, W8HL 23, W8RP 22, W8GP 22, W8BWB 21, W8BUH 18, W8DZ 15, W9CEX 15, W8CAT 14, W8CKZ 14, W9HIS 13, W8DOV 11, W8DMV 11, W9PFP 9, W8DM 9, W8BJT 7, W8AUT 7, W8FRI 7, W8AYO 6, W8DVQ 6, W8AAL 6, W8EAE 3, W8ATO 3, W8AKN 158, W8BGA 8, W8JD 39, W8WO 2, W8DXY 2, W8EVC 69, W8BRS 18, W8NR 12.

DAKOTA DIVISION

SOUTH DAKOTA — Acting SCM, Stanway Gough, W9DNS — Traffic honors this month go to W9HZT. W9FLI, who is second, was only on the air two weeks! Ex-W9BBF will be back on the air about February 1st. W8BJV has his new MOPA working. W9DB will be busy with 'phone and CW on 14 mc. W9CIR is back with the gang. W9ALO says 99.95% isn't good enough and is trying to improve his dynatron meter. W9CFU bought a new airplane and visited W9AQL. W9CFU and W9GYG have started using 'phone. A new ham at Lennox is W9FKL. Watch your frequency, fellows. W9ALO has been appointed OO. W9CJC is a new ham in the state. He moved here from Denver. W9CKF is leaving us. W9FJR is working good DX on 7 mc.

Traffic: W9HZT 1074, W9FLI 604, W9DKL 377, W9EDX 302, W9BLZ 260, W9DNS 101, W9FNM 52, W9BJV 43, W9HHW 18, W9DB 10, W9CIR 10, W9ALO 6, W9CFU 4, W9FKL 5, W9HSH 2.

NORTH DAKOTA — SCM, Guy L. Ottinger, W9BVF — It has been a pleasure to write up these last two reports because there has been a very good share of the stations in N. Dak. reporting. Let's have some applications for ORS appt. The RM, W9DGS, keeps the lead with high traffic. W9HJC turns in a good report. W9FMC reports a new station in Havana, W9AZB. W9CRL is still looking for his op's license. W9DFF is a new ORS. W9DYA reports a good total. W9DOY and W9FCA, ex-ORS's, are back in the game. W9EGI heard 33 DX stations. The Prof., W9DM, is on again. W9EVQ has a FB crystal 'phone on 3500 kc. W9BVF has an inefficient 3500-ke. 'phone going now. W9EIG did some important relaying for W9DM.

Traffic: W9DFF 41, W9CRL 16, W9DYA 56, W9FMC 12, W9FCA 37, W9DOY 18, W9EGI 109, W9DM 18, W9DGS 233, W9HJC 138, W9BVF 168, W9EUQ 10.

NORTHERN MINNESOTA — SCM, Raymond Weihe, W9CTW — This month breaks all records for the number of reports received in this section. Many new hams reporting. W9BRA takes the sweepstakes prize, a brand-new Type '10 tube. The new ORS, W9HIE, comes through the first month at the top and wins himself a nice Handbook. W9CTW is getting ready for the DX Contest. W9EOZ has a crystal 'phone on 3.5 mc. W9BVI has been QSOing all districts on one-watt input. W9GCZ was heard in France. W9DRB reports a new ham starting in Willmar. W9HDN has an MOPA perking FB. W9FNQ says nothing. Route Manager W9DOQ is on the air daily. W9DLN handled some flood relief traffic. W9EGU is changing receivers. W9FYN, W9FNH and W9AVZ are new reporters. W9HEN still wants members for his barnyard club. W9BHH is going after the off-frequency boys. W9GWR reports new stations W9HAZ and W9HEG getting ready to go on the air. W9BBL is QRL music. W9HRB went to 14 mc. for the first time. W9FNJ has no transmitter on the air. Send in your reports regularly, and get the new stations to report.

Traffic: W9HIE 193, W9BRA 176, W9CTW 89, W9EOZ 63, W9BVI 38, W9GCZ 32, W9DRB 31, W9HDN 29, W9FNQ 25, W9DOQ 24, W9DLN 24, W9EGU 14, W9FYN 13, W9AVZ 12, W9HEN 10, W9BVM 6, W9BHH 5, W9GWR 5, W9BBL 4, W9HRB 2, W9HNS 2, W9FNH 1, W9CWL 1, W9GZO 8.

SOUTHERN MINNESOTA — SCM, H. Radloff,

W9AIR — With this report the Intersectional Traffic Competition comes to a close; a whole-hearted success for this Section. W9EPJ wins the grand prize of an RCA 210, and W9BKK receives the last Handbook. FB — want more of this, gang? W9EPJ is thought to have set a new all-time individual record for this Section with this month's traffic total. W9BNN is happy in the BPL — schedules did it. W9BN is a cog in Trunk Line "A." W9BKK's new transmitter is a four-lung affair. W9FFY spent Christmas vacation with ham radio. W9HFF thinks South Mpls has about reached saturation point in amateur radio stations. W9HRH handled some Alaska traffic. A crystal will soon control the '52 at W9CKU. W9DRG visited with W9FCC, W9HEX, W9FUI and W9DGE. W9HXR joins the Army Amateur Radio System. W9EQR participates in U.S.N.R. drills under Ensign Billett, Unit Commander. W9LN reports new Mpls ham, W9EAB. W9QJ has crystal. The Minneapolis Radio Club elected officers for the year, Mr. G. Collier, WCCO-W9CWI, President; Mr. P. Hatlestad, W9HEX, Vice-President; Mr. L. Findley, W9EUK, Secretary; Jim Leach, W9DH, Treasurer. W9EYS enjoyed a 'fest at W9HCW's shack. W9EAT rumors of dismantling and leaving the air. W9DGE rebuilt the station. W9LS is putting in 50-watter. W9BBV makes his '52 a pair. W9ZT sold the 1/4 KW- and bought a 1 KW!! W9FYA is using 50-watt 'phone. W9CPM is on 14 mc. W9FJK, Mpls RM, announces YL op. Congrats, OM. W9EPD bought a Vibroplex. W9ERT is turning out new hams. W9BKK swapped houses for a better location. W9COS resigns as RM, a position he has held since 1928. W9DEI operated during vacation. W9DBC and W9HHB play radio checkers on 1.7 mc. W9FCS is tempted by 14 mc. DX. W9AQG has '80s in a bridge rectifier. W9FNK reports W9GFA and W9GLE building MOPA and W9FIL new ham at Rochester. W9HGN is installing crystal. W9YC swings into action with a staff of 10 operators. W9EFK hooked some DX on 7 mc. W9HNV moved the transmitter to a warm room. W9HNO is in radio service game. W9GUX works all U.S. districts with an '01a on 3.5 mc. W9EYL looks forward to more contests. W9CYA is trying 'phone on 3.5 mc. W9AJU ops W9QE in Mpls. W9FLE wouldn't be without a monitor. W9GHP reports W9ACB looking for schedules with other high school stations. W9DRK built new AC receiver. W9BTW, W9DHP and W9DOP were on during holidays. W9BQJ dubs his '01a the "wee voice." W9BTZ is going again. W9AIR works four bands.

Traffic: W9EPJ 1081, W9BNN 527, W9BN 491, W9BKK 392, W9FFY 236, W9HFF 156, W9AIR 115, W9HRH 78, W9CKU 77, W9DRG 50, W9HXR 46, W9EQR 37, W9LN 20, W9EAT 19, W9HCW 19, W9DGE 18, W9FJK 16, W9EPD 15, W9ERT 14, W9BKK 11, W9COS 11, W9DEI 14, W9DBC 10, W9FCS 9, W9AQG 8, W9FNK 7, W9HGN 6, W9YC 4, W9EFK 3, W9HNV 2, W9ZT 2, W9GUX 2, W9EYL 1. December W9EPD 15, W9EFK 4, W9BQJ 1.

DELTA DIVISION

MISSISSIPPI — SCM, William G. Bodker, W5AZV — W5ANX is the banner station with a splendid BPL total. W5BZG reports experiments with break-in 'phone with W5ANX. W5AXG and W5ANQ are new stations in Jackson. W5AWP reports DX good on 1750-ke. 'phone band. W5VJ is building a 3.5-mc. crystal-controlled 'phone. W5BUI has renewed his ORS. W5APR turns in a last minute report with some total. Flood relief traffic is being handled by W5ANX, who is keeping schedules with W5FR in the flood area. W5AZV has just completed a new 3.5-mc. MOPA. W5AAY is on 3.5 mc. with push-pull MOPA 'phone.

Traffic: W5APR 1048, W5ANX 768, W5AZV 207, W5BUI 117, W5ID 102, W5BZG 90, W5AAY 73, W5BOT 42, W5BNW 47, W5AWP 10, W5BYE 7, W5VJ 2.

ARKANSAS — SCM, Henry E. Vette, W5AB1 — Thanks for the nice reports, fellows. We appreciate them. We need more O.R.S. The SCM would appreciate receiving applications. W5BML made the BPL. W5IQ has a nice traffic total. W5BKB has his license again. W5BED is a new O.R.S. W5BPE has a new National all-AC receiver. W5FM is on the air from his new address. W5JK reports through W5BML. W5CCY is back on the air again. W5BRI has his MG repaired and is on again. W5CR's transformer went

west. W5AAJ reported by radio. W5BDW is using a type '10 tube TPTG circuit. W5LK is on 1750 kc. with crystal 'phone. A new organization is the Fayetteville Association of Radio Amateurs. W5BXM is secretary and W5CR president. W5SI is on 3.5 mc. W5HN is working on a 14-mc. 'phone transmitter. Please send in ORS certificates promptly to be renewed before they expire.

Traffic: W5BBI 670, W5IQ 271, W5BKB 57, W5BED 56, W5BPE 32, W5FM 19, W5JK 19, W5CCY 13, W5AAJ 10, W5CR 10, W5BRI 12, W5BDW 5.

TENNESSEE — SCM, James B. Witt, W4SP — The SCM would like to see a lot more of you fellows send in traffic reports. W4OI sent in another FB report. W4AFM is a close second. W4RO has gone crystal-controlled. W4GX has rebuilt his outfits. W4FX is using Pentode crystal Osc. W4SP is using Pentode oscillator and Buffer. Let's go, gang!

Traffic: W4OI 150, W4AFM 130, W4GX 68, W4OV 38, W4AD 16, W4SP 7.

LOUISIANA — SCM, Frank Watts, Jr., W5WF — I wish to express my appreciation to the gang for reelection as SCM for the next two years. With your cooperation we will build up a section hard to beat. All stations are invited to send in a report of their activities. Alexandria: W5ANQ is kicking out with a '52. W5BFP has a new circuit every night. W5AXD is on once in a while. W5AXU has been trying a Type B modulator. New Orleans: W5BPL is QRL with work. W5HR made a fine traffic total on 'phone. Minden: W5BZR is getting FB reports from all over the U.S. and South America. W5AQC was making a nice tweet with a '10 until the BCLs took a hand. W5CBT is building a FB crystal 'phone. W5CDQ reports working two VKs. W5BYX visited W5WF and the Minden gang. W5APA is building a 150-watt transmitter. W5ARY is the portable call of W5CDQ and W5CBT. W5APN is the portable call of W5BZR. Plaquemine: W5KC sends in a report. W5ACY is still in A.A. net. Monroe: W5BDJ has nearly completed a new transmitter. W5FR works on 3.5 mc. W5KE reports from Gretna. W5AKT sends in a traffic report. Shreveport: W5AIB has been sick. W5BYY has a 50-watter. W5BYQ is perking with a '10. W5BJA is silent. W5RR-W5WI (the father and son station) is kicking. W5AYZ (the YL) is on with a crystal. W5AYA is using 3.5-mc. 'phone. W5ASJ is back on now. W5WF is kicking out and both ops (the SCM and The Kilocycle Kid) are at the helm.

Traffic: W5AKT 13, W5KE 36, W5HR 123, W5BPL 20, W5AXU 12, W5KC 12, W5BYY 10, W5BYQ 11, W5WF 10.

HUDSON DIVISION

EASTERN NEW YORK — SCM, R. E. Haight, W2LU — W2BZZ, recently appointed R.M., heads the list with FB total. W2DEL, new ORS, reports nice total. W2BLU has new transmitter. W2CVL captures 1st Grade Ticket. RM-W2BJA, confined to his room, reports nice total by bedside operation. W2CTC at QRA 617 Draper Ave. W2CGO is busy with SARA Club activities. W2ANV keeps busy with schedules. W2BVR tried to clean snow and ice from his sky wire when it came down. W2UL's CC signals penetrate Hollywood, Cal., on 3.5 mc. W2CJP wants traffic and news. W2BKM desires some good traffic schedules. W2AJD offers to QRG for Gang. W2BER gives code practice for prospective ham. W2ACY is QRL on all bands. W2ACB is back again. W2KW, ex-2CCD, joins ORS gang. W2BXP replaces '10s with '03A. W2CFU, new ORS, makes initial report. W2BJX sends in FB report. The Mid-Hudson Amateur Radio Club elected W2ALI, President; W2DKP, Vice-President; W2BJX, Secretary; W2AGZ, Treasurer. W2BWG, W2BCO, W2BYF and W2AEQ are experimenting with 56-mc. 'phone. W2BCO is making a television receiver. W2CGT is working all bands. W2BCR of Newburgh is working the world on 14 and 7 mc. with his lone '10. W2CGT, W2AGZ and W2BJX new possessors of the Blue Ticket. W2AVS works plenty on 1750 kc. with low power. W2BWG, W2BYF, W2BCO, W2COY, W2CEO and W2DKP are working on 'phone. W2CGT and W2BJX are ALL CW. W2OP is QRL with A.A. activities. W2BDB completed new MOPA. W2BUN is prospective ORS. W2BWF, OO, reports activities. W2BSH is all set for contest

activities. W2FJ joins the gang with first report. W2CBX is QRL at college. W2CQH will be on air soon with portable. W2ACD is using 'phone and CW. Our Section led the division last month, and your SCM is very much pleased with traffic report this month. Let's keep in the lead. And who knows, that banner may be ours yet! As you know, the system has been changed.

Traffic: W2BZZ 937, W2LU 177, W2DEL 164, W2BLU 130, W2BJA 83, W2CTC 83, W2CGO 71, W2ANV 68, W2BVR 44, W2UL 33, W2CJP 27, W2BKM 26, W2AJD 26, W2BER 21, W2ACY 16, W2ACB 15, W2KW 12, W2BXP 11, W2CFU 11, W2BJX 9, W2OP 8, W2BDB 7, W2CGT 7, W2BUN 7, W2BWF 7, W2BSH 6, W2FJ 3, W2ACD 3, W2AVS 12.

NEW YORK CITY AND LONG ISLAND — Acting SCM, W. J. Warringer, W2BPQ — With this report I have been Acting SCM for one year. W2BGO, 3330 Fenton Ave., The Bronx, N. Y. City, having finally become straightened out will resume his SCM duties next month. In closing I wish to thank the gang for their cooperation, especially the Long Island and Staten Island gang. They have risen from the depths till now are our leading sections. ORS appointments this month are W2AUS and W2KG. Official Observers W2VH and W2KG were both high men in Frequency Measuring Contest. Cancellations for failure to report for three months: W2CKN and W2HO, both ORS. Long Island: A report received postmarked Flushing, traffic total 126, no signature or call. Hi. W2ADQ, a new ORS, leads the whole section. FB. W2AIQ is busy with trunk lines. W2AUS is still knocking out about 200 per month. W2BDN: What kind of spark coil you using, OM? Hi. W2CHK turns in a good report. W2KG is also active in trunk lines. W2COI has made application for ORS. W2AVP is our star reporter. W2BJ, old 2BDJ of ten years ago, is back again. W2AKL reports after long absence. W2BFG is having trouble with the BCLs. W2OT is working overtime organizing a L.I. net. Good work, OM. X8BIL is waiting for his call. W2CSS, Treasurer Nassau Radio Club, reports. W2AST now has a 1/4 KW 'phone. W2CRB has a new MOPA. W2HE is new supervisor at WNYC. W2CGA is active at Erasmus High Radio Club. W2CEI sold his piano to make room for transmitter. Hi. W2ARV is on 7 mc. W2KJ is an ex-Cornell man. W2AEX became an uncle on January 10th. W2CJA has crystal on 14 mc. Brooklyn: W2PF has a new National SW-3. W2BO is using a PP 14-mc. rig. W2DBQ now has crystal on 3877 kc. W2CHT will be an ORS soon. W2CCD's pet peeve is A.R.R.L. forwarding foreign ORL cards. Hi. W2AZV handled Auto Show traffic. W2BEG is hard at work in new office. W2BAS had visit from R.I. W2CUD has a new boiler. W2LB is still working with U.S.N.R.F. W2BRB has been on a lecture tour. W2AZN reports W5ACA visiting at his shack. W2BIV says his ant. fell down. W2BEV has a fifty on 7 mc. Bronx: W2CBB did good work in Canada-U.S.A. Party. W2CYX is looking for men for U.S.N.R. for duty on battleships with pay. W2BGO can't make an MOPA work. W2AJG is back with long story. W2AFT is still hard at work in AA net. Recruits needed. W2CWP is teaching his YL the code. W2BQK built a '52 Hi C rig that works only Low C. Hi. W2VH is doing good work as OO. W2APV drops in late as usual. Hi. W2CAP is looking for a back yard to erect his antenna mast. W2FF: No report for second month. Staten Island: W2WP, our new RM, is keeping a flock of schedules. W2CEP moved to White Plains. CAP above is ole 2ANE of STY Radio Club. W2CKN: ORS cancelled. W2DHK is about due for ORS appointment. Manhattan: Have often wondered what Manhattan's report would look like with W2SC out. Hi. Doesn't look like much. W2BNW reports after four months layoff. W2AOY is now an AA and ORS. W2BNL is still working on 56 mc. W2CSQ has a new job. W2BDJ now has crystal on 7 mc. W2AOU reporting for Manhattan Radio Club says meetings now held at Public Library 145th St., Hamilton Grange Branch. Meetings on first, second, fourth and fifth Fridays of the month. Exit the Acting SCM amid mingled boos and cheers. Hi.

Traffic: Long Island — W2ADQ 364, W2AIQ 191, W2AUS 183, W2BDN 87, W2CHK 60, W2KG 55, W2COI 43, W2AVP 18, W2BJ 12, W2AKL 6, W2BFG 3, W2??? 126, Brooklyn — W2PF 76, W2BO 71, W2DBQ 57, W2CHT

48, V
4, W
37, V
Island
17, V
No
Jr., V
up a
donat
hand
This
opera
hand
W2C
a excl
run in
W2C
W2C
works
W2C
W2B
W2D
3500 i
letters
new ju
W2AI
station
late ev
work
W2AL
accom
W2CM
W2DI
traffic
time.
expect
mitter.
ply. W
is back
W2AU
is to w
is loca
plenty
mitters
Traff
W2CJ
4, W2
W2DG
2, W2B
8, W2B
6, W2
W2AU
IOWA
Griff
W9DF
from W
with W
W9EJQ
fellows,
month,
dope. W
run up h
says the
his traffi
license.
and a r
cracks d
A.A. traf
the old
though p
reports n
schedule
traffic fro
leave of
has lots
W9ANO
3.5-mc.

48, W2CCD 22, W2AZV 19, W2LB 14, W2BRB 5, W2AZN 4, W2BIV 1. Bronx — W2CBB 45, W2CYX 38, W2BGO 37, W2AJG 34, W2AFT 20, W2CWP 6, W2BQK 6. Staten Island — W2WP 72, W2DHK 15. Manhattan — W2BNW 17, W2AOY 16, W2BNL 8, W2BDJ 4.

NORTHERN NEW JERSEY — SCM, A. G. Wester, Jr., W2WR — W2BPY, our new Route Manager, has stirred up a lot of traffic interest in this Section. W2AEY will donate 50 QSL cards to the amateur of our Section who handles the most traffic from February 15th to March 15th. This does include stations manned by more than two operators. W2WR threatens to break out in the 3.5-mc. band. W2COG is devoting all time to a new receiver. W2CWX is getting prepared for the Sweepstakes. W2AGX is exclusively a DX hound. W2CJX stays on 14 mc. W2AMR ran into difficulties in the renewal of his ORS certificate. W2CNL was assigned the call of W2DNZ for portable use. W2CPR works sixes easier than any other district. W2CWR works plenty with low power. W2DHU uses a TNT circuit. W2CQL is reported engaged to the YL 2nd Op at W1AVK. W2BAZ is coming back on with WJZ's old transmitter. W2DGQ is pounding amateur brass. W2AUI is going up to 3500 kc. W2ACL is on 7 mc. with PP rig. W2CAH gets letters from YLs to whom he delivers traffic. W2BAI has a new junior YL opr. W2BUB has a real high power 'phone. W2AIN, a 'phone man, has just added a super het to the station. W2CCS wants schedules with Western stations for late evenings. W2AGM will go touring soon to visit stations worked. W2COV has fast change overs to work 7 or 14 mc. W2ALY is on the road to become a professional piano accompanist. W2ASB has three pentodes in his transmitter. W2CMP, our YL station, gets a kick out of working OM! W2DIU at Fort Monmouth handled the greatest amount of traffic this month. W2ABT was an ORS in Akron at one time. W2AGO has had trouble with the BCLs. W2CAE expects to rebuild his transmitter. W2AIF has a new transmitter. W2ALD is experimenting with emergency plate supply. W2DFM did not find much time to operate. W2CLX is back after a sea trip. W2BBU sent in a very detailed report. W2AUP handled his traffic with K5AA. W2BRP's ambition is to work a VK. W2BSA attends Columbia Univ. W2CAO is located in the Armory at Perth Amboy. W2AMB finds plenty of time to operate. W2BTZ is always changing transmitters. W2CQX worked all continents in 19 hours.

Traffic: W2COG 2, W2AOS 39, W2CWX 39, W2AGX 4, W2CJX 30, W2AMR 15, W2CNL 16, W2BPY 23, W2BKE 4, W2AEY 14, W2CPR 6, W2DHU 14, W2CQL 11, W2DGQ 32, W2AUI 4, W2ACL 6, W2CAH 14, W2AUQ 2, W2CCS 15, W2AGM 9, W2COV 7, W2ALY 4, W2CWD 8, W2BBR 3, W2AZL 2, W2CQX 11, W2BRP 3, W2BSA 6, W2ABT 6, W2AGO 63, W2DFM 11, W2BBU 58, W2AUP 65, W2DIU 202, W2ALD 80.

MIDWEST DIVISION

IOWA — SCM, George D. Hansen, W9FFD; R. P. Griffith, RM — New appointments this month are ORS; W9DFZ; OO, W9CWG; also have applications for ORS from W9GWT and W9BJP. Two make BPL this month with W9IO leading the throng. Right at his heels is the RM, W9EJQ. W9FFD hammers out a fair score. LISTEN, fellows, THE IOWA ORS HANDSHAKE is due next month. You will receive a circular very shortly with the dope. W9AWY replaces the '81s with a pair of '66s. W9ABE runs up his total on Christmas and New Year traffic. W9EIV says the Army helped. W9BJP had the honor of nosing out his traffic rival this time. W9EFU has hard luck of expired license. W9ACL reports lots of "ham doings" in this town, and a new station, W9DUE. The new ORS, W9DFZ, cracks down on them with a fine report. W9DPO says lots of A.A. traffic. W9GWT has aspirations for ORS. W9ERY has the old schedules working. W9BPG comes through even though part of the time was ill and quarantined. W9FLK reports no news. W9BWF says OM SKIP defeated him on a schedule. W9CWG is taking care of a part of the RST traffic from Chicago. W9DNZ keeps busy. W9FEB requests leave of absence. W9AFQ reports a good total. W9ECB has lots of visitors. W9CFB does well with low power. W9ANO has the PP MOPA working well. W9HDF works 3.5-mc. 'phone. W9FZO turns in his report. W9AYC has

'phone on 3.5 and 1.75 mc. W9AHX is working 1750-ke 'phone. W9DIB is still scrapping with the Kennelly Heavieside Layer. Hi. The total goes up, and so does the message per station average. Fine work, fellows. Keep coming with those reports and don't forget the news. Let's have your opinions of the "Iowa ORS Handshake" — Criticisms, suggestions, shoot them in. OHKAY, IOWAY.

Traffic: W9IO 1102, W9EJQ 745, W9EIV 219, W9AWY 195, W9ABE 191, W9FFD 188, W9BJP 142, W9EFU 140, W9ACL 133, W9DFZ 130, W9DPO 70, W9GWT 66, W9ERY 56, W9BPG 55, W9FLK 52, W9BWF 48, W9CWG 36, W9DNZ 31, W9FEB 30, W9AFQ 27, W9ECB 22, W9CFB 21, W9ANO 17, W9HDF 11, W9FZO 10, W9AYC 9, W9AHX 9, W9DIB 3.

KANSAS — SCM, J. H. Amia, W9CET — W9CFN, RM, leads the state. RM — W9FLG lost a rectobulb and a filter condenser. W9DVQ is handling lots of A.A. traffic. W9FRC has the hottest QSL card in the state. W9NI has trouble with low line voltage. W9FRU is the proud owner of a new monitor. We miss W9BNU's large total. W9DEB is back on the air. W9GCL is one of the operators at Army Radio WVC. W9GHI and W9COE have combined. W9ESL is talking up dummy antennas to the 'phone men. W9CXW is going on a three weeks vacation. W9BQW is in college at Ferris, Ill., signing W9BWP. W9BVQ has a new 7½-watt CC 'phone on 1750 kc. W9BRM is having a lot of QRM from YLs. W9ATG is on with MOPA. W9HWW is working W9NI on schedule for Nat'l Guard traffic. W9EVT is out of town a lot now. W9GBP has an MOPA on 7 mc. and PP TNT on 3.5 mc. W9FXY is using crystal on 3.5 mc. and PP TNT on 7 mc. W9ATR has a new crystal rig. W9PV is working all bands. W9EVM has changed from '45s to '10s in PP. W9GFM likes 14,000. W9ADM is QRL school. W9DQJ has intaker troubles. W9DFY has moved to K.C. W9CXS is on 1750 'phone. W9CCS is planning a 14-mc. 'phone. W9BEB wants to work the SCM. W9JA is busy holding down two jobs and going to college. W9CSE, an old-timer, is back on the air again. W9FMX got a 7088 crystal for Christmas. W9HUB and W9DSI are running a race to see who can build the most up-to-date 'phone. W9BSK has a 1750 'phone. The SCM wants to thank all of the clubs which are reporting in a body, and would like to have a report from the secretary of every active club in Kansas on traffic and what the members are doing. Every active ham in Kansas is asked to report to the SCM on the 16th of each month. Let's turn in bigger and better reports.

Traffic: W9FLG 127, W9DVQ 154, W9NI 137, W9FRC 64, W9CFN 302, W9FRU 25, W9DEB 46, W9BNU 6, W9CGL 47, W9ESL 35, W9CXW 17, W9HWW 184, W9CET 56, W9EVT 33, W9GPB 12, W9FXY 44, W9GFM 17, W9DFY 11, W9DQJ 17, W9EVM 11, W9PV 12, W9ATR 12, W9BGL 59, W9BEB 19, W9FMX 15, W9GXD 10, W9BSK 7.

NEBRASKA — SCM, S. C. Wallace, W9FAM — W9BNT heads the list this time. W9DI is second high and what a total!! W9FUW is the hottest 'phone traffic man ever. W9FAM wants all the hams at the convention in Grand Island, March 26th and 27th. W9DMY is keeping a lot of FB schedules. W9EWO is doing a little 'phoning now on the side. W9EYE sends in a fine report. W9DGL handles a good total. W9EHW is trying to keep his part of State on map. W9DXY says he is one of the boys. Hi. W9EEW says skip has been fierce. W9BBS is rebuilding W9CMY portable. W9BQR is still plugging along. W9DTH says not much traffic. W9EW is trying to put Omaha back in the ring. W9BHN doesn't say much. W9DHC and W9HTU send in good reports. W9BB sends in first report. W9GAS has finally started handling traffic. W9DHA is working on convention plans to be held March 26th and 27th at Grand Island. W9AZT reports.

Traffic: W9BNT 1088, W9DI 1017, W9FUW 619, W9FAM 513, W9DMY 355, W9EWO 258, W9EYE 127, W9DGL 116, W9EHW 91, W9EEW 15, W9BBS 12, W9BQR 5, W9DTH 4, W9EW 86, W9DHC 153, W9BB 140, W9HTU 94, W9GAS 88, W9AZT 4, W9DHA 77.

MISSOURI — SCM, L. B. Laizure, W9RR — St. Louis: Ex-spark W9EFC, who was 9CUF in 1922, is back on the air using 1750 and 3500-ke. bands for handling. W9GDU says the depression is so bad he can't buy wire.

WICFG is going strong. WIBEZ has been experimenting with receivers using a Pentode. WIBOZ is in line for ORS. WIAPX gets a little DX with his traffic. WIBUO has a very nice total. WICRP reports DX. WIDFQ sends in his second fine report. WIBLI is rebuilding again. WIEF reports a few. WICIP, WIBWS and WIAQW are keeping Lewiston on the map. WICEQ reports new apparatus. WIMT and WIBSO send in their first reports. WIVM is back after a lay-off. WIAFA schedules England. WIBFA says skip effect tough. WIAJX reports lots of activity around his neck of woods. WIBWB was the hero of the Portland Hamfest. WIIR reports at last minute. The Queen City Radio Club put over a fine party on New Year's. The P.A.W.A. put on a splendid Hamfest in Portland January 6th.

Traffic: WIBEU 405, WICDX 401, WIBOF 306, WICPT 303, WIATO 282, WICFG 258, WIBEZ 199, WIBOZ 195, WIAPX 175, WIBUO 105, WICRP 92, WIDFQ 78, WIBLI 67, WIEF 65, WICIP 50, WIBWS 43, WICEQ 23, WIMT 20, WIAQW 20, WIVM 18, WIAFA 17, WIBFA 11, WIAJX 7, WIBSO 7, WIBWB 7, WIAQL 6, WIBWI 2, WIQH 10, WIIR 38.

NORTHWESTERN DIVISION

IDAHO — SCM, Oscar E. Johnson, W7AKZ — W7AT has a new pentode receiver. W7AFT is keeping schedule with VE4FR. W7KG has been working the east coast every evening on 3.5. W7BRU is a new ham in Boise. W7AYH has taken over VCR schedules until W7BKF has new transmitter in action. W7ATN's new crystal outfit is FB. W7BAU has new MOPA. W7ACD has gone away to school. W7BAA reports with news. W7AVP and W7YA ask for ORS appointments. W7ACO is now a full-fledged ham. W7AJQ comes on after a long lay-off. W7AKZ has been trying to buy a bug. W7ALW is still going strong. W7BEO is having transmitter trouble.

Traffic: W7AYH 42, W7AVP 11, W7BAA 33, W7ATN 10, W7KG 22, W7AFT 8, W7AKZ 20.

MONTANA — SCM, O. W. Viers, W7AAT — Great enthusiasm was shown this month by the number of reports received, and the SCM is greatly pleased. Let's keep it up, gang! W7BGC at Terry is our newest ORS. W7BBS lost his antenna a day before moving to a new location. W7EL is still in Stevensville. W7ASB has been busy. W7AHP is busy with A.A.R.S. and Navnet work. W7CU and W7ASQ sent their ORS tickets in for endorsement. W7HP, the RM for this Section, says he has requests for "out of State" schedules. Anyone interested with schedules write to W7HP R. H. Lindeberg, 111 South Jordan, Miles City, and he will fix you up. W7AFS has been working lots of Aussies and Zeeders. W7AIR is still rebuilding. W7AYG was operated on for appendicitis. W7AST has been having great results with a lonely '01A. W7BNU is a new station at Whitefish. W7BKM, also of Whitefish, says he will help the SCM keep Montana on the map. W7AVV of Hardin is in Lincoln, Nebr., taking an aviation course. W7AAT has joined Trunk Line "A" running from Seattle to New York City. Anyone wishing a fast reliable QSP along Trunk "A," just shoot your traffic to W7AAT, who will be found on the 7000-ke. band every day. The SCM wishes good fast schedules with the following: Denver, Salt Lake City, San Diego, San Francisco and any of the Montana boys on 7 mc.

Traffic: W7AAT 29, W7ASQ 21, W7CU 15, W7AHP 12, W7BBS 3, W7AFS 14, W7BKM 7.

OREGON — SCM, Dr. Dolph L. Craig, W7ALO — Hurrah, our faith in giving W7ACH ORS Nr. 1 is fully vindicated. He makes the BPL his second month as RM, ORS. Next comes W7AWH, a non-ORS, with a dandy total. If old reliable W7WR hadn't reported with 97 Portland wouldn't have had a hundred. Hi. Only a single traffic report from Coos Bay, W7AVT, and PL the only one in Pendleton who seems to handle messages. W7AEM, another non-ORS, is third. W7BFO, a newcomer in Salem, sends in a big total. W7PK is on 7 and 14 mc. with crystal. W7AJN reports. W7QY reports a good traffic total; he says W7BQY is new ham in Portland. W7ZD is collecting dough for a new '10. W7AYN is using portable call 7BRQ. W7SY reports again. W7PE reports new ham, W7BOG in Tilla-

mook. W7ALM and the SCM should get together for a mutual consolation party about this repression. W7ED is rounding into form again. W7BMR is going to enter the W-VE contest. W7PL sent in a breezy letter full of Pendleton doings. W7AMF has noticed that the 3500-ke. band skips. W7APE is official BC station for Coos Bay area. Coos Bay Club sends in some news. W7AHJ, AJX, BLN drove to Eugene to visit the new club there, December 26th, and had a fine time. W7AJX has new 3500-ke. Zepp. W7AHJ works K7s and VE5s on 3.5 mc. W7AEJ has new crystal rig working. W7AHZ visited Coos Bay gang for a few days. W7BLN likes the A.A.R.S. W7BKG has a FB crystal signal. W7ALO is on 3800 ke. (cc.).

Traffic: W7ACH 509, W7AWH 264, W7AEM 105, W7WR 97, W7BFO 80, W7ED 76, W7ALM 67, W7AMF 39, W7PE 32, W7PL 29, W7AYN 25, W7AYV 13, W7AXO 12, W7AVT 19, W7PK 11, W7SY 10, W7BMR 6, W7EN 5, W7AJN 2, W7QY 109.

ALASKA — SCM, W. B. Wilson, W7WDN — Several applications for ORS but, sorry, they do not all start off with the right foot. A good ORS will have been a consistent report to his SCM before the appointment is issued. K7BLI is steadily building up his traffic totals and reports daily schedules with K7BDE, K7ANQ, K7DLR, K7BOE and K7ABQ as well as bi-weekly with K7ALN. K7PQ just finished a small transmitter with Edison battery plate supply for a keeper at one of the light stations, who expects to get on the air soon. K7BEU at Sentinel Island says he doesn't have much luck getting outside. K7BLI reports the following: K7BNV is a new ham in Tanana. K7BOE is handling traffic. Almost all traffic for states is moving through K7FF to W7TX on daily schedule. Following stations are active: K7ALN, K7ACZ, K7ATF, K7ARG, K7ASM, K7BIE, K7AUM, K7ATD, K7ANM and K7KN. K7ANQ is making trip to Unga. K7BDE is closing down and going to states.

Traffic: K7PQ 10, K7BLI 296, K7FF 232, K7BNV 5, K7BOE 70.

WASHINGTON — SCM, John P. Gruble, W7RT — Many thanks for the election, gang. The old Washington spirit is returning. Let's go! Our new Route Manager is W7QI. Give him a buzz for traffic problems or schedules. W7AVM at Aberdeen is OBS. Listen for broadcasts from him on Sundays, 12:00 noon, on 7140 kc. W7BB leads in traffic, with W7HS of Spokane running a close second. W7TP is having receiver trouble. W7TX and W7ANP make BPL on deliveries. FBI From Olympia we get two good reports by W7KZ and W7AIT. A real old-timer, W7DF of Auburn, reports the formation of ham club at Renton. W7HI is about to return to the air. W7JJ, W7WU, and W7BT, all of White River Valley, working out of town. With two '10s in final stage of crystal rig, W7BIU handles a goodly amount of traffic on 3.5 and 7 mc. W7WY, of Vancouver, kicks through with FB report as new ORS. W7ACB, W7BHH, W7ART, W7AMT, W7AEV, W7ASY, W7ARW, W7AIU, and W7APS all help Seattle pile up the points. As traffic manager for the Spokane Radio Operators' Club, W7AHO reports for that city. W7KQ is Official Observer, so watch your frequencies! W7AG-W7SL does all his work on 3.5 'phone. W7AAX reports about fifteen stations active at Tacoma. W7AIE sends first report from Moran School. We are indebted to W7AHQ for a newsy letter on Anacortes region. W7AJ and W7AF maintain schedule on 3.5 mc. W7ARQ boosts Bellingham. W7AJ, W7BAO, and W7BNI keep Wenatchee going on CW, while W7US and W7ACQ hold up for 'phone. W7TK reports from Everett, and is holding down heavy A.A.R.S. and naval work on 3.5 mc. W7EK is rebuilding into crystal and '04A. W7ACY uses '52 in final of crystal outfit. W7NR and W7AKP get on occasionally. W7DL and W7ASY grind crystals for the gang. (Free advt. Hi!) W7DN reports. W7AQB cooperates by sending dope on Aberdeen activities. Seattle's YL op. W7BCB, reports to the SCM via telephone. Hi. W7AQ sends Western Union telegram reporting for W7AGV and W7BLG. W7HB, Mercer Island, recovers from illness and celebrates by working VS6AN on 7 mc. with a '10. W7AOK, W7BFZ, W7EA, and W7GN are Seattle High School stations. W7HE is juggling crystals. W7IC is active in A.A.R.S. work at Yakima. From same locality we receive good reports

from: W7ADS, W7BCS, W7AYO, W7AEX, W7ANF, W7AQ, W7AUC, W7BLG, and W7AGV. It grieves us to record the passing of Mr. Oraee Bowers, of Yakima, whose untimely death came through an accident in which he was electrocuted while erecting an antenna. W7BAC gets crystal note from two '10s and works ZL, VK and CM on 7 mc. W7AAO is busy with U. of W. engineering. W7BHW is active at Tolt. W7IA upholds Kirkland's 'phone reputation. W7VG is experimenting on 14 and 28 mc. W7OV is sitting tight, waiting for ships that never come in. W7JF has nice crystal rig with '52 in final, on 7014 kc. W7ID keeps Seattle A.A.R.S. work going. W7AAE is to increase power on 3.5 'phone rig. The following reports come through our ex-SCM, W7ACS, who is now enjoying 'phone work on 3.5 mc. W7AVN and W7BZ handle a few. W7BRT is new man at Seattle. W7OI just returned from furlough and is ready to resume old schedules. W7BID at Mukilteo sends nice letter and dope. W7AGE is certainly coming along FB with a '45 in TNT. W7BJV is trying to put up antenna and get Oesota on the air. Excellent report received from W7BCV at Walla Walla. W7BDD resumes ham work after absence due to illness. W7BBH gets R8-9 from Hawaii. W7BEF decides to pound brass again. With the above reports, Mr. Piety turns the SCM work over to W7RT. W7ANP is new ORS, while W7WG, W7APS, W7AFC, and others make applications. Present ORS please note: cancellations are in order when you fail to report three times consecutively. Be consistent. Only live-wires wanted in ORS group. We wish to welcome the following new stations reported: W7BSD, W7BES, W7BRX, W7BSL, W7BSZ, W7BGE, W7AGV, W7BRI, W7BQH, W7BGR, W7BQB, W7BLX, W7BID, W7BGJ, W8AIL, and W7BMU. Keep up the good work, fellows, and watch us go!

Traffic: W7BB 338, W7HS 319, W7TX 205, W7ANP 164, W7BIU 141, W7KZ 133, W7WY 112, W7RT 107, W7AHO 81, W7TK 81, W7ID 65, W7AAE 62, W7APR 57, W7AVM 50, W7BCS 46, W7OV 44, W7AIT 42, W7AGV 40, W7ACB 38, W7AZA 33, W7DL 30, W7BHH 30, W7QI 29, W7AIU 32, W7KQ 28, W7AYO 26, W7BCF 26, W7AG 26, W7HB 25, W7IA 24, W7AIE 22, W7GN 21, W7ARQ 18, W7BAC 18, W7APS 17, W7AAX 16, W7AJI 16, W7BCB 14, W7AQB 14, W7ANF 10, W7BCC 10, W7JF 7, W7EA 6, W7ADS 6, W7BHW 6, W7AMT 6, W7AHQ 6, W7AEX 5, W7ACY 4, W7ARW 4, W7BLG 4, W7BFZ 3, W7JT 2, W7BSD 3, W7AQ 2, W7ART 2, W7AUC 2, W7AOK 2, W7BNI 2, W7AEV 2, W7BAO 1, W7ASY 1, W7IC 1, W7BCV 203, W7AGE 117, W7BDD 43, W7ACS 24, W7AF 22, W7AVN 16, W7BID 12, W7BZ 9, W7OI 7.

PACIFIC DIVISION

SANTA CLARA VALLEY—SCM, F. J. Quement, W6NX.—There was some fine work displayed this month and a total of eighteen stations reported to make the month of January a banner month from the standpoint of stations reporting—that denotes interest which is certainly encouraging to the SCM. W6AMM had a clear field this month with a nice fat total of 542 TRANS-PACIFIC MESSAGES, W6FEY came in second with another batch of Trans-Pacific stuff, totaling 281. FB, fellows. School vacation hit W6YG this month. W6BYY put over a nice total, as did our reliable brass pounder, W6BMW. W6FBW, W6DSZ and W6BTJ are always ready to handle traffic for Santa Cruz or San Jose. W6ALW has 250-watter on air now! W6BAX was heard on 28 mc. by ZL2AC. W6DDS is building a W6NX receiver. Hi. W6NJ was third high this month. W6FBU is carrying on radio experiments at Stanford. W6BDR reports that his twin brother, W6BEU, is on the U.S.S. *Point Chico*. W6DEQ is on the *Constance Chandler*. W6DNY is on 3500 kc. W6DBQ has new antenna. W6DCP put up a pair of 45-ft. towers. W6CEO and W6CEI are trying 56 mc.

Traffic: W6AMM 542, W6FEY 281, W6YG 89, W6BYY 63, W6CEO 3, W6BMW 50, W6FBW 16, W6DSZ 19, W6BTJ 15, W6ALW 39, W6BAX 20, W6DDS 21, W6NJ 93, W6FBW 20, W6BDR 21, W6DNY 15, W6DBQ 6, W6DCP 10.

NEVADA—SCM, Keston L. Ramsey, W6EAD.—W6ATN is back on 'phone after an absence of about five years. W6BYR is putting in push-pull modulation. W6AAX

working Army schedules. W6CRF is back on 'phone. W6EAD is working a little DX with the new transmitter. W6AJP has been appointed Route Manager. See him for schedules. W6UO reports traffic. Things are looking up in Nevada. Let's have a big report next month. New hams, send in your reports.

Traffic: W6AJP 49, W6CRF 10, W6UO 8.

EAST BAY—Acting SCM, H. L. Bassett, W6BSB.—W6FBH of Santa Rosa started the year off by copping first place with a total of 294. W6RJ continues to maintain his standing with a neat 277. Third place goes to W6ATJ. W6EDR's radio work is held up due to rain coming thru the holes in the roof. Hi. W6DLT is a busy op. now that he is working the A.A.R.S. W6CDA kept a schedule with K6BOE. W6EDO of Pope Valley is still on the air. He reports that W6CIB has been off for some time. W6EJA can hear plenty of DX. W6CYD is very busy with college. W6BTZ has opened a school for amateur and commercial neophytes. W6CDP is busy moving the shack from the garage to the house. W6ZX has decided to put in a crystal rig. W6BKM has been very QRL. W6AF recently installed a Hertz (pronounced Hair-tz) antenna. W6CTX is the genius behind the new ZX crystal rig. The Oakland Radio Club held its annual election in December, and the elected officers are: W6AOJ, President; W6CUG, Treasurer; Montague, Secretary, and Bob Rawlins, Sergeant of Arms. W6AKB has charge of the club code class with an enrollment of 18. W6ASJ is again teaching the radio service class at the Central Trade School in Oakland. W6BSB has taken over the radio installation work at the Hotel Oakland. Now that we have a new Director and feel full of pep, we should start the traffic ball rolling and knock over that elusive banner which has evaded our futile efforts this past year. When the EB section starts they are hard to stop, so what say, fellows?

Traffic: W6FBH 294, W6RJ 277, W6ATJ 231, W6EDO 205, W6AF 156, W6ZM 110, W6CDA 106, W6BGR 104, W6CYD 83, W6AOH 50, W6CTX 47, W6EJA 45, W6BKM 44, W6BTW 30, W6PB 30, W6DLT 8, W6EDR 3.

SAN FRANCISCO—SCM, Clayton F. Bane, W6WB.—Well, well, sort of looks as if things were sort of picking up. Let's see if we can't get all the gang to report. Ole W6BNA does himself proud this time with his best total so far. W6MV reports a peach of a total. W6DFR reports in rather late, but his report is worth it. W6NK says the Navy drills are keeping his totals down. W6AVO startles us all by handling a flock of traffic. W6CAL says the W-VE contest was great stuff. W6ERK sends in some traffic. W6DZZ is very busy lining up stations for the trunk routes. W6ECS is on his way to college. W6ADK has taken the fatal step from which there is no returning—installed crystal. W6ABB handled a few messages. W6DHE got some in between blown out fifties. W6IU also joined the ranks of the crystal jugglers. W6DK reports as usual. W6CZK finally succeeded in getting on with his fifty. W6DJJ says his report isn't so hot. The SCM finally got a report from ole W6SC after much struggling. W6WB and W6PW both have their supers working.

Traffic: W6BNA 209, W6MV 122, W6DFR 116, W6NK 89, W6AVO 74, W6CAL 68, W6ERK 41, W6DZZ 39, W6ECS 28, W6ADK 21, W6ABB 14, W6DHE 7, W6IU 8, W6DK 7, W6CZK 2, W6DJJ 16, W6SC 75.

SAN JOAQUIN—SCM, E. J. Beall, W6BVB.—It looks like the old spirit came back to start the New Year off. If it is your New Year resolution, keep up the good work. We had one corking good time at the regular quarterly Section meeting held at Fresno January 9th-10th. We made it a joint A.R.R.L.-U.S.N.R. meeting, the U.S.N.R. meet being held on Sunday. Eighteen new reservists were signed up. R. A. Jack, W6AHO, deserves a lot of credit for that undertaking. W6SF came in with his regular report of the Stockton gang. W6CXT joined the Reserve. Don't forget, gang, to start your new serial numbers on the messages. W6FFU keeps schedules with W6BVB and W6AME. Philbrook is operating the MJC school transmitter W6YB. Jack reported for W6YE. W6AOA holds the high traffic station of the Section. W6AME built a nifty push-pull TGTP transmitter. W6BUZ is consistent on his 1750-kc. code practice schedule. W6BJE says a Baldwin speaker

makes a good mike if you jam a sock down its throat for damping purposes. W6BIP reported for the Fresno hams. W6CYY made 21 points in the Canadian-U.S.A. contest. W6BWK is on 14 mc. daily. W6DQV is off temporarily rebuilding. W6BYH came through with a traffic report and the SCM passed out. W6EKH and W6BVY built a couple of TNT transmitters. W6EKH found his plate supply was 1100 on each side instead of 1100 center-tapped. W6DZN, W6DXL, W6BBC, W6EXH and W6SF are the traffic handlers in Stockton. Date, J. V. of Hughson was elected President of the Modesto Radio Club.

Traffic: W6DZN 95, W6DXL 36, W6BBC 32, W6EXH 34, W6SF 2, W6FFU 49, W6YB 18, W6BYH 131, W6YE 21, W6AHO 20, W6AOA 692, W6AME 4, W6BUZ 14, W6BVY 107, W6EKH 5.

SACRAMENTO VALLEY — SCM, Paul S. Farrelle, W6AXM — "Help!!" "More ORS and larger traffic totals wanted." See the SCM for more details. W6AIM is spending most of his time listening on 600 meters. Hi. W6DYF was appointed to Fort Benning, Ga., for a four-month Army communication course. W6BLX is back with us after a long absence. Ex-KA1DJ is now signing W6APJ at Mather Field. W6BYB has a very FB P-P '52 rig. W6ELC seems to be able to hear DX at any time he cares to. W6UM has been spending his vacation?? (or — honeymoon???) in Hawaii. W6AFU tells us that a new club has been formed in Roseville. W6AAC says DX is rotten. W6CMA has been rebuilding. W6DKW is busy with his low-power rig. W6AUO wants the SCM to accept a commission in the U.S.N.R. W6EOU has an MOPA that really works. W6AID has a rig that seems to get out of town. W6EOC just about burned up his crystal 'phone rig. W6CAW has his ears and dynatron all set for off-frequency hams. W6EJC, OO, says some of fellows have a regular band of their own — either below RXC or above XDA. W6DON was seen with YLs again. W6ENC is ye official scribe of the local amateur club. W6QT has a very FB crystal rig. We think that W6CGJ has given up the ghost. W6ADS has been heard calling CQ DX. W6GX has the bug again. W6EFM has been working 3.5 mc. and 7 mc. W6ECN has been having trouble with his P.P. '52 crystal rig. W6BSN has a very FB note. W6AK has gone high power. W6FW has been playing with a National SW3. W6EMK is on the air when the YLs let him alone. Hi. W6EUH and W6EVD are busy with the A.A.R.S. W6EDV is still using 3.5-mc. 'phone. W6EAG has W6EOU's old '52 rig. W6DUL has been having the hard job of making a Colpitts transmitter work. W6DVE is working on 3.5 mc. W6DQU is a new call in town. W6DLO has been heard. W6DDU, W6DDV, W6CTH, W6CSG, W6CRN, W6CKH, W6CKF, W6CFP, W6CBZ, W6BTG, W6BNQ, W6BJ, W6BIQ, W6BHM, W6AYV, W6ATM, W6APE, W6AJD, W6ALN, W6AHN, W6AID, W6ADV, W6AEE, W6ABE and W6ACT are new calls in this Section. The SCM would like to hear from these fellows every month. No matter how small your traffic totals are, send them in!

Traffic: W6AIM 13, W6AAC 14, W6AFU 14, W6BYB 12, W6CMA 13, W6AXM 69.

LOS ANGELES — SCM, H. E. Nahmens, W6HT — To promote interest and competition, reports henceforth will be listed by counties. This will also make it possible to note at a glance the amount of activity in the various parts of the Section. If your county is low, make it a point to urge more stations to report. Drop me a card with any suggestions you have. Los Angeles: Two men make the BPL, W6ETJ and W6CXW. Chief RM, W6ETJ, is high-point man for the entire section. W6CXW worked H18X for his 35th country. W6SN comes through with his usual fine report. W6ACL took traffic from ZSSU three days in succession. DX on 3.5 mc. is improving every day according to W6BVZ. W6BLS is a new ORS. W6BJA is back from vacation. W6EGH was QSO his 23rd South African. W6UU was home from U.C.L.A. for holidays. W6EJZ is to be complimented for the work he did gathering holiday messages. W6ALG cleared a stack of them. W6AKW of Lancaster wants more men up that way to join the Army Net. W6AM has more time for ham work since he went back to his old job as Manufacturer's representative. W6EBK finds time to pound key at W6YAS. Believe it or not, this is route of messages handled by W6BGF-W6BJF-W6BGF-

W6BQF. Hi! W6CUU reports for first time. W6EKZ and W6FEW are both working for an ORS appointment. Reports have to be pried loose from W6AOR. W6ON will soon have a crystal job on 7280 kc. Both W6AKD and W6ESA are in bed with the flu. W6BPU is back on the air. W6DZI reports two inches of snow at his QRA. Hi! W6TE is playing with 28 mc. W6DSP reports that W6ETM is DNCs for Army Net in sixth district. W6EUV says his transmitter took heart when SC beat Tulane and started perking again. W6TN promises higher total. W6CGP is handicapped by school. W6VO has his crystal heap working OK at last. W6BUX is leaving us to return North. W6DOZ received his WAC certificate. FB! W6BME reports that W6DNO has been in hospital recuperating from operation. Our big traffic man, W6BCK, has been in same fix. W6EQD was on air while home over Christmas. W6BHP is a brand-new ham in Tuhunga. W6RZ is working for an ORS appointment. W6EGW has changed over to a Zepp feed. W6HT is now 200 watts crystal-controlled. W6EXQ is trying to run the input up on his new '52 to beat W6EGH. W6EFH has a GE P-J-8 tube which he says is sure a demon for punishment. W6OF is setting up his crystal rig in L.A. W6DNA rebuilt to pair of '45s in push-pull. W6AEO has new AC receiver. W6BVR is off air due to shortage of tubes for his crystal job. The following report traffic but no news: W6DEP, W6EQW, W6BYF, W6BVD, W6CZT, W6DJC, W6DQG and W6FAV. Santa Barbara: W6YAU made the BPL and handled traffic from Peruvian Observatory to Washington, D. C. W6EZK is moving to Santa Maria. W6DJZ is coming to the front as a traffic man. W6EDZ gets out FB with his '71A push-pull job. W6DBJ is building AC receiver. W6DYQ is back on 7 mc. W6DFG will be on as soon as his monitor is completed. W6LC is rebuilding. W6AB, the S.B. club station, has been idle due to activity at home stations. A good R.M. will soon be needed in this territory. Riverside: W6CFN-W6NF is right at the top as usual and in the BPL. W6DLV is on leave. Send in your reports, gang! San Luis Obispo: W6ALQ, high-point man, has been helping new hams in Atascadero get on the air. W6DWW sends dope on rest of gang. W6ENR and W6AJL have joined U.S.N.R. W6ANS packed some duds and hit the trail. W6EGC sends weather reports to W6YAU twice daily. San Bernardino: W6CVV leads this country. W6BHK is in line for ORS appointment. This territory has great potentialities. Reports from the Redlands gang will do the trick. Ventura: No activity reported! Won't some ham put this county on the map? Mono and Inyo: Anyone knowing an active ham in either of these counties, please drop me a card. The A.R.R.C. now meet every Wednesday at 8:00 p.m. in the Arden Dairy Plant at Third Street and Robertson Blvd. in West Los Angeles.

Traffic: W6ETJ 511, W6CFN 384, W6YAU 265, W6CXW 248, W6SN 230, W6ACL 183, W6BVZ 178, W6EGH 173, W6BLS 163, W6BJA 111, W6DEP 104, W6BYF 93, W6EKZ 91, W6UU 73, W6EJZ 67, W6EQW 66, W6CUU 65, W6ALG 63, W6AKW 60, W6AM 54, W6EBK 54, W6BGF 53, W6ALQ 51, W6DJS 40, W6CVV 34, W6AOR 32, W6DWW 30, W6BVD 28, W6ON 26, W6FEW 25, W6ESA 25, W6CZT 21, W6BPU 17, W6DJC 16, W6DZI 15, W6BQG 15, W6BIK 15, W6TE 13, W6DSP 9, W6AKD 8, W6EUV 8, W6TN 7, W6EGC 7, W6CGP 6, W6FAV 5, W6VO 4, W6YAS 4, W6BUX 4, W6DOZ 3, W6BME 2, W6EQD 2, W6HT 61.

ARIZONA — SCM, Ernest Mendoza, W6BJF — W6ALU-W6CDU was 8th in the frequency measuring test. W5AHI-W5ZZT, former SCM of New Mexico, now at Yuma, was 11th. W6CQF made 99.85. W6BJF made 75 contacts on 3500 kc. in 9 hours during the Army-Amateur contest, one QSO every 7 minutes, and 375 points. W6DNE (WZP operator) piled up his fine total in one week's time. A new ham in Warren is W6AGL. W6BJF is working W5AOD, W5VQ, and W6ETJ on the new Trunk Line "E" from coast to coast. W6EUT has 4 good schedules east and west. W6BLP is a prospective ORS. W6BVN's *Ariz. Short Wave Radio News* is being mailed to out-of-town hams at 15 cents a month. Every Arizona operator should subscribe to this up-to-the-minute paper. W6AEK, W6BYD, W6CKW, W6EL, W6DJH and W6EFN are all using double button "mikes." W6EFN's 50 watt soft. W6CVW sends

his OBS schedule in as being at 5 p.m. M.S.T. daily on 7100 kc. W6CQF reports working a Jap. W6DHA of KTAR is now a married man. W6EEB, his old roommate, will use a 50-watt CW set, and Dave will finish the big 250-watt 'phone! W6AND is absorbed in super-het converters. W6EBP and W6DOW are also experimenting with supers. X-6CWI-6EXC is working on a 3.5-mc. 'phone. X-6EKP may go to the coast for another call any day now. X-6DWP has his operators' ticket back. W6HS-W6DKX must leave us for another position in Tennessee and Louisiana. He was President of the A.S.W.R.C., Route Manager, ORS and A.A.R.S. He will be missed always. X-6CCN is sure to be elected next President of the A.S.W.R.C. W6CPF has sold out all of his equipment, and will leave for Scotland very shortly. Another good man lost. W6DKF is putting in a converter. W6FAI is dead on the air since he got married. W6EFC is dabbling in low-power 'phone. W6BYD is completing his class "b" push-pull modulator. X-6CEC gave an excellent talk on 56-mc. receivers and transmitters at the radio club. W6DOW is modulating his PP TNT '10 transmitter on 3.5 mc. with a '45, 'cause the neighbors can't appreciate brass pounding! W6DSQ wants some code practice. Too much 'phone makes the wrists stiff and the throat sore! W6CAP is a newly appointed ORS in Warren. W6FGO is trying to work a current fed Zepp on its fundamental at 14.7 and 3.5 mc. with the aid of series and shunt condensers. W6AEK had a dandy 'phone until the day that he put in a 2nd stage of speech amplification!

Traffic: W6ALU 768, W6DNE 237, W6BJF 237, W6EUT 92, W6BLP 47, W6BYN 20, W6AEK 18, W6EFN 15, W6CVW 13, W6BYD 3, W6CQF 1.

PHILIPPINES — Acting SCM, I. S. Liner, KA1SL. — This report received via radio by W6AMM and mailed to HQs. Many new hams starting. Three crystal-controlled stations now going, and the rest are putting out smoother signals, since a.c. is now unhealthy tone. Ask KA1DF. KA1XA is experimenting on 28 mc. KA1UP is using 50-watt with filtered R.A.C. KA1NE is fixing up his 50-watt mud slinger to get better note. KA1CM was rushed with Christmas traffic. KA1RT is now operating (the wife is away). KA1CO's receiver trouble is fixed up. KA1JR is building 'phone. KA1SP wants W6 schedule three days a week. KA1SL finally got crystal going. KA1HR has fine bunch of schedules and makes BPL as usual.

Traffic: KA1HR 1229, KA1CM 184, KA1SP 62, KA1SL 66, KA1NE 15, KA1UP 4.

HAWAII — SCM, L. A. Walworth, K6CIB. — This is the last SCM report of K6CIB. He has resigned on account of heavy school work. K6COG will carry on as Acting SCM until a regular election can be held. The new Radio Club, the OARC, met at McKinley High School, December 19th. A good time was enjoyed by all present. K6FCX has been a consistent OBS since his appointment. When the volcano became active December 23rd, FCX began at once to broadcast the interesting news, and contacted W6QU of Los Angeles, who scooped the news to the Los Angeles newspapers. It is reported W9BEZ and W4AND also got these broadcasts. FB, FCX, K6BMY, also of Hilo, sent several volcano reports to the coast. On December 20th and 21st K6AUQ, K6BOE, K6DV and K6CIB handled over 60 messages of good will from Hu Governor's office and important citizens to rulers and statesmen of nearly all Pacific countries. Even the King of Siam should receive three in his far location. K6ALM, K6BJJ, K6CRW and K6DJU have put 3500-ke. 'phones on the air. K6DVZ has regular traffic schedules with OAAU of Peru to relay Carnegie Institute messages to VK6MO. Hon. Victor K. H. Houston, delegate to Congress from Hawaii, sent seasons greetings to all amateurs of Hawaii. FB, Delegate Houston. K6AJA was on the sick list for three weeks. K6CMC is working on 14 mc. K6DJU entertained the OARC, January 6th, at Schofield Barracks. K6BOE made BPL.

Traffic: K6AUQ 334, K6FCX 202, K6DV 66, K6CIB 60, K6IR 55, K6DVZ 42, K6AJA 39, K6DLH 34, K6ERO 14, K6COG 11, K6 (unsigned) 9, K6BOE 535.

SAN DIEGO — SCM, Harry A. Ambler, W6EOP. — W6QA with two schedules leads the Section this month. He reports interest in 1750 kc. in the Imperial Valley. W6BAM is now on the 3.5 band. W6AXV says traffic is

picking up. W6BGL was on the sick list. W6CTP with the '71a is still busy on the air. W6AXN reports a new ham in Calexico, W6CNQ. W6BCT is coming on with a 50-watt. W6ACJ finally got back on the air. W6CTR is heard on 1750 kc. with 'phone quite often. W6EPF is on the 3.5 band. W6AYK is trying to make a schedule with W6QA. W6AKY is working DX. W6AYQ is QRL with college. W6EAB is in the same predicament as W6AYQ. W6CXN is heard occasionally. W6DDJ has added a '52 to his crystal. W6EFD is still doing his stuff on 'phone. W6BEY figures on getting on the air again shortly. W6DAZ is QRL repair work. W6AGJ attends A.A.R.S. regularly. W6BEY and W6EAB are getting ready to try 56 mc. The Imperial Valley Radio Club held its regular monthly meeting at the Barbara Worth Hotel, El Centro, Tuesday night, January 12th. Every one had a big time. Regular meetings in the future will be held on the second Monday in the month, and visitors are cordially invited. W6EOP built a new 50-watt rack and panel set. W6HM, Col. Clair Foster, our new Director, was in town during the holidays. We want to congratulate the Colonel, and hope he comes down here often. The semi-annual election of officers of the Pi Alpha Tau was held the last Monday in December. W6AJM was elected Grand Chancellor and W6BOW Secretary and Treasurer. The San Diego Chapter is now the Alpha Chapter, and a new chapter, the Beta Chapter, is located in Long Beach. W6DNS has hopes of coming on the air soon. W6DNW is QRL catering to the stage girls at the Fox Theatre. W6QY is now on 7 mc. W6EOL has a new receiver. W6DNL is on a cruise to Honolulu. W6VQ was on a hunting trip down in old Mexico. W6BFB has a new 50-watt TPTG. W6DAI will soon be on with a new rack and panel job.

Traffic: W6QA 52, W6BAM 27, W6AXV 26, W6BGL 22, W6CTP 9, W6EOP 8, W6AXN 5, W6BCT 3, W6CTR 2, W6ACJ 3, W6AYK 2, W6EPF 2.

ROANOKE DIVISION

WEST VIRGINIA — SCM, C. S. Hoffmann, Jr., W8HD. — W8CAY did some good relay work during an electrical show in Charleston. W8CHM, X-W8BNZ and W8CAY attended the Covington, Ky., Hamfest. W8OK led the state with 53 QSOs during the one-night Army-Amateur QSO Contest. W8BDD reports a successful code class in Huntington, with W8EGA at the head. W8CDV and W8AZD are using new MOPA jobs. W8ELO had slight illness. W8TI works W8HD on A-A schedules. W8BOW is doing some good traffic work. W8CSF is working W4AIS on schedule. W8DPO is doing his usual good work. W8BWK is up on 3.5 mcs. W8FFO is working the West Coast with an '01a. W8FQV is new ham in Huntington. The SCM would like to hear from the following relative to ORS appointment: W8BDD, W8BIZ, W8CAY, W8CMJ and W8CFB. Keep up the good work, gang. Maybe we can beat the Virginia gang yet! W8CXR is building an all-'phone band 'phone transmitter.

Traffic: W8CAY 176, W8BOW 69, W8HD 54, W8BWK 42, W8OK 37, W8AZD 34, W8TI 31, W8CDV 23, W8DPO 21, W8CFB 14, W8CSF 14, W8FFO 9, W8ADI 8, W8CMJ 5, W8FAA 3, W8BDD 7.

NORTH CAROLINA — SCM, H. L. Caveness, W4DW. — The Old North State led the Roanoke Division in messages handled per station for the month ending December 15th. Congratulations, fellows, and let's keep up the good work. W4AIS reported 490 messages for December which would have put us in fourth place in the whole United States instead of sixth place, — if his report had only been in time to get in QST. W4AHS is interested in becoming OBS. W4RE has been rebuilding his crystal outfit. W4TR is at it again. W4US, a pre-war ham, is back on the air in Wilmington. W4AAE is keeping a schedule with VE3GT. W4ZH was on the air during the silence of W4AOE. W4IF handled quite a bit of traffic for NY1AA. W4VN, an old ham, but new in this state, is doing some fine work on 3.5 mc. W4AVT, W4RE, W4MI, W4VN and W4DW are on the air almost every day during the noon hour. W4AVT and W4ANU both have completed their crystal outfits. W4ABW is on the air occasionally. W4NP sends in his first report. W4MR works about everything he hears. W4AGF is rebuilding into crystal-controlled. W4AKS is busy with the

printing business. The Asheville High School Radio Club has just been organized with W4AL as President; W4EJ, Vice-President; and W4AU, Secretary. W4MI has been helping train some beginners. W4WI was home from Washington for a brief vacation. W4GG reports building a new portable receiver. W4AEH has two '10s in push-pull on 3.5 mc. W4AGD has been appointed ORS. W4EG has just worked his fifth continent, and only Asia now stands in his way for WAC membership. W4ATC and W4AOE were off the air during the Christmas holidays. W4BCG is a new ham in Wendell, and W4AFI is a new one in Raleigh.

Traffic: W4AIS 80L, W4VN 202, W4ZH 193, W4DW 167, W4MI 113, W4AOE 78, W4IF 62, W4AVT 60, W4AAE 26, W4AHS 12, W4ABW 8, W4MR 8, W4GG 5, W4NP 5, W4TR 5, W4RE 4.

VIRGINIA — SCM, R. N. Eubank, W3AAJ — S. T. Terry, R.M.-W3WO always has good total due to lots of FB schedules. W3AAJ and W3BSM handled message re Missing Flyer in W. Va. W3BAI requests ORS. W3APT's power supply went west. W3CAH sends nice report for 15 days. W3CA is sure a real traffic man. W3AGH is a real Route Manager. His total is lower due to operating two stations, W3AGH and W3ABS. W3ABS handled lots of traffic. W3AGY is working lots DX on 3.5 mc. W3BJX has finally gotten ORS through. W3AFT is keeping CM8YB schedule while W3YD is off. W3QN, Richmond's YL, is getting new power supply. W3NT worked Guam. W3ARD sends report. W3AMB has new dynatron. W3NE reports antenna blew down five times. W3CEP is new station at Phoebus. W3BBX operated at W3ABS during Christmas period. W3BSB is using '45 now. W3BGS is handling traffic again. W3BRD reports on activity in Norton. W3AVR applied for ORS. W3ZA attended first meeting of Lynchburg Club. W3BEK is operating 'phone. W3BTM installed crystal. W3BMO reports new ham in Front Royal soon. W3ZU has new transmitter on air. W3FE is to celebrate first anniversary with crystal. W3FZ built new single control transmitter. W3BRY is active again. W3AHW sends first report for long time. W3BTR's QRA is now Bristow. W3BRA plans to participate in contests. W3BEV is still active. W3BZ, our beloved Director, has been confined to bed and house since December 24th. Sorry. W3GQ has 500-watt crystal going at Emory. W3AHV is now on 3500. W3YD is inactive due to reorganization. W3BFD-3BCI let licenses expire. Watch yours. W3CAH-3BAI-3EJ-3GE-3AAJ have added SW-3 receivers. W3GE-3BFQ will be on air soon. Richmond Club put on outdoor dinner, January 19th, with fine results. W3OM at Ft. Monroe wants schedules. W3FJ, located at First Regt. Armory with 250-watt rig 3638.9 kc., wants schedules. W3BJE is still on 7000. W3BAG reports some new hams in state. W3BUR is moving. W3BSB has new dynatron. W3RS was QRL Christmas holidays and vacation. W3CFL went away to Ohio for holidays. W3AEW is rebuilding. W3BMN is back on with '10. I want to thank every one for their fine cooperation in putting Virginia in the running. Note our standing in January QST. I also thank each one who helped me get SCM position. I will do my best. I ask your help and reports.

Traffic: W3WO 655, W3AAJ 624, W3BAI 366, W3APT 199, W3CAH 177, W3CA 171, W3AGH 204, W3ABS 162, W3AGY 109, W3EJ 107, W3BJX 93, W3AFT 65, W3QN 57, W3CFL 52, W3NT 56, W3BSM 56, W3ARD 45, W3AMB 40, W3NE 40, W3ADJ 17, W3BBX 17, W3BSB 16, W3AEW 16, W3BGS 15, W3BRD 15, W3AVR 10, W3BPB 7, W3ZA 7, W3BEK 7, W3BTM 6, W3BMO 6, W3ZU 5, W3FE 5, W3FZ 4, W3BRY 3, W3AHW 3, W3BTR 2, W3BRA 2, W3BEV 2, W3OM 31, W3FJ 21, W3BJE 17, W3CXM 384, W3HJ 10.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, E. C. Stockman, W9ESA — Our traffic this month jumped way ahead of any preceding month, and your SCM is pleased to receive such good reports. W9DNP makes BPL. W9AAB reports two months' traffic. W9BJN is busy grinding crystals. W9GNK is working 2-way 2-band QSOs with W5MF. W9DQD moved key and receiver in where it's warm. W9CWA is trying to quiet some BCLs. W9EFP would like to see more Colorado 'phones on 1750 kc. Lots of activity in A.A.R.S. Sunday mornings, 7 to 8 o'clock, due to organizing efforts of

W9EAM. Ex-W6CEB is located at Palisade instead of Grand Junction, as reported last month. His new call is W9EHZ. W9GCM gave a turkey dinner in honor of W9RX, W9EHZ, W9DQD, W9BRZ and a prospective ham, Cliff Rader. W9BTO has been issued ORS certificate. W9CDE, W9APZ, W9FPZ, and W9CND report.

Traffic: W9DNP 810, W9ESA 301, W9AAB 501, W9EAM 73, W9GNK 27, W9CND 10, W9BJN 9, W9FPZ 8, W9CDE 7, W9CWA 5, W9DQD 4, W9APZ 1, W9EFP 1.

UTAH-WYOMING — SCM, C. R. Miller, W6DPJ — W6EXL heads the list this time. W1ZZA reports being heard in New Zealand on 3.5 mc. There has been much rebuilding and traffic handling going on at W7BOV lately. W6DAM has a new bug. W6BSE is now a member of the A.A.R.S. "B" batteries furnish plate power at W7AWG. W6DWH is using a National SW-3. Wish W7AAH and some others would put a little news in their reports. W6BTX is very busy. W6APM made a good score in the A.A.R.S. contest on January 11th, as did W6EYS, W6EXL, W6BSE and W6DAM. W7ADF again sends in much pertinent news. W6DPO has a commercial ticket now. Power QRM bothers W7NY. W7AMU is having transmitter and antenna trouble. W7ACG has his '10s going now. W6AHD is still the only active station in Southern Utah. W6EZX will be on soon. W6DPJ put the rock back in to hold down a pair of 211s. W6DQP, the Utah U.S.N.R. control station, may be heard on 3895 kcs. W6DTB is a new station in Woods Cross, Utah. W6FEB has joined the A.A.R.S.

Traffic: W6EXL 81, W1ZZA 78, W7BOV 57, W6DPJ 52, W6BSE 25, W6DAM 23, W7AWG 13, W6APM 9, W7AAH 9, W7ADF 8, W7NY 6, W6BTX 6, W6EYS 6, W7AMU 1.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Robert E. Troy, Jr., W4AHP — W4PK is keeping schedules on two trunk lines. W4ASM now has crystal control. W4ZX has gotten his 'phone going OK. W4AHZ has a new '45 push-pull transmitter. W4AAQ has time to operate some. W4AEZ is getting good results with his 50-watt modulators. W4RS is keeping up his fine work. W4AZE is about to go on the air at his new location in the U. of A. Engineering building. Ex-4AHR of Montgomery is getting QSL's due the new W4AHR. Hi. We need more ORS in Alabama. Some of you fellows apply for an appointment. And please don't forget that the 16th is reporting day.

Traffic: W4PK 52, W4ASM 9.

EASTERN FLORIDA — SCM, Ray Atkinson, W4NN — The New Year is under way. Let's really make this the outstanding year for our Section. The Jacksonville Club (JAROC'S) win the second heat in the Wouff-Hong Trophy Contest with a total of 179 messages. W4WS is high man this month, using 'phone, too. W4GS comes next, followed by W4ABL, W4AEM, W4TK, W4ZU and W4HY renewed their ORS. W4HY says business takes up most of his time. W4TK, W4HZ and W4AKL are still at WJAX. W4ZU and W4IK are combining soon. W4AQT and W4GM are rebuilding. W4FP visited in Jax on his way north. All of us regret the death of W4FZ's mother. W4VP reports that two new stations will go on the air at Daytona Beach shortly. W4ASR is back in the traffic swim. W4GR is a busy man. W4MF, W4EY, W4PK and W4DU are real active 'phones. W4ABZ is really getting out. W4BBB is located at Lake Helen. Our crack Tampa 'phone, W4ABL, will be off the air awhile on account of health on the bum. W4ZV says give us DX or sumpin. W4FZ has a hot crystal. The Miami gang are to be congratulated on the fine work they did at the All-American Air Races. W4ALI moved out so far it took the power company 30 days to stretch a line there. A word to the non-reporting ORS should be sufficient. Do your duty. Please, fellows, won't you help me put our Section where she belongs? Make those reliable schedules at once and let's really make an effort. W4AER has a portable transmitter. W4AIJ and W4PI like to smoke pipes at radio meetings. Phew! The cottage of W4AGB and W4NN is just full of hams. Well, CUL, as I must finish my masterpiece, which, by the way, is entitled, "Don't Be Shocked By An Amateur." Aw Nerts! Ur rite. 73.

Traffic: W4WS 169, W4GS 124, W4ABL 74, W4NN 75, W4FZ 65, W4FP 73, W4VP 55, W4ABZ 30, W4AEM 18,

(Continued on page 72)

• I. A. R. U. NEWS •

Devoted to the interests and activities of the

INTERNATIONAL AMATEUR RADIO UNION

President: H. P. MAXIM

Vice-President: C. H. STEWART

Secretary: K. B. WARNER

Headquarters Society:

THE AMERICAN RADIO RELAY LEAGUE, West Hartford, Conn.

MEMBER SOCIETIES

American Radio Relay League
Asociacion E. A. R.
Associazione Radiotecnica Italiana
Canadian Section, A.R.R.L.
Deutscher Amateur Send-und-Empfangs
Dienst
Experimenterende Danske Radioamatører

Lwowski Klub Krotkofalowcow
Nederlandsche Vereeniging voor In-
ternationaal Radioamateurisme
New Zealand Association of Radio
Transmitters
Norsk Radio Relé Liga
Radio Society of Great Britain
Rede dos Emissores Portugueses

Reseau Belge
Reseau Emetteurs Français
South African Radio Relay League
Sveriges Sandareamatörer
Union Schweiz Kurzwellen Amateure
Wireless Institute of Australia
Wireless Society of Ireland

Conducted by Clinton B. DeSoto

MUCH time and effort is being devoted to the organization of the European Rag-Chewer's Club by the officers *ad interim*, and from this distance it begins to look as if a movement of really worthwhile possibilities is being inaugurated. The latest development is a mimeographed monthly periodical called "Rag-chewing," under which heading is a telegraph key and the sub-heads, "For International Friendship. Improving Operating and Concentrating Ham Spirit." The initial issue contained four very readable pages, the principal subject of discussion being organization plans incorporating a comparison with the American R.C.C.

The objectives of the club are to broaden the opportunities for casual air conversations in order to inject added interest into amateur communication, aside from either pure DX or experimental work, and to intensify use of the 3.5 mc. band upon the continent, particularly on Saturday nights. Weekly broadcasts to the membership giving news and pertinent information regarding R.C.C. affairs are sent by selected member-stations, and membership is being solicited of every active amateur station in Europe. The annual dues amount to one half dollar, this including the subscription to "Rag-chewing." One must be sponsored by three present members in order to join. C. A. Gehrels, PA0QQ, acting secretary, is confident

that, "within a year every amateur in Europe will be proud to be a member of that unique international ham organization, R.C.C.!"

At the Annual General Meeting of the R.S.G.B. held in London on December 22, 1931, the following were elected to serve on the Council for the year 1932:

President, Mr. H. Bevan Swift, G2TI

Acting Vice-President, Mr. A. E. Watts, G6UN

Honorary Treasurer, Mr. E. D. Ostermeyer, G5AR

Honorary Secretary, Mr. J. Clarricoats, G6CL

Mr. A. W. Alliston, G5LA; Mr. J. D. Chisholm, G2CX; Mr. A. D. Gay, G6NF; Mr. J. W. Mathews, G6LL; Mr. H. B. Old, G2VQ; Mr. T. A. St. Johnston, G6UT; Mr. J. C. Watts, BRS246 and Mr. H. V. Wilkins, G6WN.

Mr. G. W. Thomas was also reappointed to the honorary editorship of *The T & R Bulletin*.

Following the meeting Mr. D. N. Corfield, G5CD, lectured on the measurement of speech and music qualities. His lecture was reproduced in the February issue of *The T & R Bulletin*.

We anticipate the pleasure of presenting in these columns each month henceforth brief summaries of the history of amateur radio and the present status of the amateur art in the countries of our various member-societies, in the form of articles written by headquarters officials of the various societies. The first of these comes from Italy.



ERNESTO MONTU,
PRESIDENT, A.R.I.

Amateur Radio in Italy

By Ernesto Montu, President A.R.I.

Amateur transmission in our country started in 1923 and 1924, coincidentally with the opening up of the high frequency region in radio. Many notable records were established by Italian ama-



A ZEDDER HAM GROUP ON AN OUTING

Left to right, standing: W. Hughes, ZL3CY; Leslie W. Hurrell, ZL3BG; Miss E. Herrick, ZL3BT; J. B. Elliott, ZL3CC; S. H. Perry, ZL2BC; D. V. B. P. White, ZL3CZ; and a BCL. Seated: Leslie C. Evans, ZL3AB; R. J. Tabley, ZL3CT; L. A. B. More, ZL3CN; C. W. Parton, ZL3CP; C. J. Banwell, ZL3AD.

teur experimenters during those early days; some of the most important were:

Adriano Ducati of Bologna (ACD) making his first transatlantic communication on 105 meters with ulMO (Jan. 25, 1924);

the work of other experimenters at the same time, including Eugenio Gnesutta of Milan, 1GN; Ernesto Montu of Milan, 1RG; Giulio Salom of Venice, 1NA; Mario Santangelli of Milan, 1ER; and a few others;

the reception of 1NO, owned by Franco Marietti of Turin, in New Zealand, on 90 meters, March 23, 1925;

the reception of 1RG in Argentina on 40 meters, May 20, 1925, and

the initial 40-meter QSO with New Zealand made simultaneously by 1RG and 1ER on May 31, 1925.

In May, 1924, the Radio Club Nazionale Italiano was formed in Milan. This served the purpose of a national amateur organization until 1927, when in January the Radio Club Nazionale Italiano and the Associazione Dilettanti Radiotecnici Italiani joined together to form the present Associazione Radiotecnica Italiana (A.R.I.).

Very few amateur licenses were ever granted in Italy. Since the beginning of 1929 all licenses have been refused, and radio transmission outlawed except for a very few experimental government or military stations. Notwithstanding, a few amateurs still keep sending under cover, but their enjoyment of the hobby is naturally impaired.

The A.R.I. has at the present time nearly 400

members, mostly radio technicians and amateurs in the continental sense of the word. There may be a few transmitting members, but we must ignore that fact. The A.R.I. is on very good terms with the Postmaster General, Admiral Prof. Pession, but in spite of this we meet with a decided refusal every time we attempt to negotiate the granting of transmitting licenses.

An annual convention is held regularly by the A.R.I., generally in October. The society organizes the "Mostra Nazionale della Radio," each year, usually holding it in October, too, in Milan. Our president is also president of the executive committee formed of the leaders of the Italian radio industry.

The official organ of the A.R.I. is "Il Radiogiornale," which has been published since 1923. The headquarters of the society is maintained at Viale Bianca Maria 24, Milan, and the annual membership fee is 40 lire (about \$2.00).

MEXICO CITY, D. F. XIAX JAN 10 CK 37
INTERNATIONAL AMATEUR RADIO UNION
WEST HARTFORD, CONN., U. S. A.

IT IS A GREAT PLEASURE TO INFORM YOU THAT TODAY WAS DULY ORGANIZED THE MEXICAN RADIO EXPERIMENTERS LEAGUE WHICH SENDS GREETINGS TO ALL THE AMATEURS OF THE WORLD THROUGH YOU

(SIG) FRANCISCO CASTRO HERRERA
VIA W4TO VIA XIM 1/10/32

December 13, 1931 witnessed the winter ham-fest of the N.V.I.R. in Amsterdam. About 180 Dutch amateurs were in attendance to hear the lectures on screen-grid valves, Westinghouse rectifiers and their use in measuring r.f. currents, and multi-stage crystal controlled transmitters. A big lottery in which \$300 worth of prizes were distributed was the big event, these having been donated by the N.V.I.R. and several Dutch manufacturers. A 75 watt screen-grid tube went as first prize to Th. J. Wilmink, PA0TW, according to C. A. Gehrels, PA0QQ.

The following amateurs became members of the WAC Club during the year 1931:

George David White, ZL1FU; C. N. Edwards, ZL1AA; F. Kenneth Mase, W2VD; F. Joseph, W6BTO; Ivan R. Hodder, VK3RH; P. J. Brewer, VK5JA; W. J. Nicholls, VK3WX; Robert Jardine, G6QX; R. Boell, ON4AR; Frank Lucas, W8CRA; A. S. Andrews, VQ2BA; O. W. Gilson, ZL2BZ; Charles Fielding Fox, VQ4LMA; R. Verstrepen, ON4AA; Capt. A. E. T. Payne, VK3PP; John Mayes, W6BYB; Galen K. Weaver (originally issued to Dudley F. Ashhead), W8CFW; Thomas C. Hall, W6DJX; P. Johnson, G5IS; J. Pirene, ON4JA; A. H. MacKenzie, VK4GK; Leo J. Feenaghty, VK4LJ; Col. J. Skola, OK2VA; B. L. Capstaff, W2CDQ; S. W. Boon, ZL2DN; Louis Roland, ON4JB; Elliott Sigourney, W6DPF; Barton Carriek, W6EJC; José Ruiz Cuevas, EA852; P. E. A. Griffiths, G2GF; Jean Denimal, F8EX; Charles Scholpp, Jr., W2ABU; Louis Holléa, HAF3A; Harold N. Walls, G2DH; S. W. Cutler, G2OL; Don Penton, ZL1AS; K. L. Elliott, ZL2GJ; C. L. Nelson, W5MS; H. E. Whatley, G2BY; Raymond E. Groebe, W2AEY; L. Richard, ON4UF; J. H. Makkink, PK3BQ; H. A. Pickering, OM1TB; A. C. Smythe, VK5MF;

(Continued on page 72)

• CALLS HEARD •

W2CL, Harry F. Washburn, 333 Packman Ave., Mount Vernon, N. Y.

7-mc. band, November-January

em2ef em2na em6sg etlah earct f8bs f8pz fm8gt hb7c k4aop k4ug k5aa kfr6 nmlnc pylff w6adx w6aem w6afy w6anq w6aor w6arp w6bkm w6cgv w6ctp w6cuh w6cul w6cvf w6cwx w6dde w6der w6djc w6dos w6dru w6dsc w6duc w6ebe w6ebg w6eep w6elf w6egh w6exa w6feb w6idu w7aat w7afm vk3bh vk3bw vk3ml xlm z3az z3cs

W3BET, 1007 Parker Ave., Collingdale, Pa.

em1by em1fm em2ax em2ef em2fn em2jm em2pa em2sh em2ss em8uf em8yb etlaa etlow chrc ear52 ear113 ear121 f8fm f8ji f8od f8ast g2ay g2vq g5by g5lw g5ml g6vp g6wy g5nj hclfg haf3d hb7c ilev k4aan k4akv k4bpf k4kd k6erh lefh lu2ea lu3dd lu3de nmlnc olss pylcm py2bn rx1aa rx1ao ti2ags velab velah velam velax velbl velbm velbv velco veldr ve2aq ve2bb ve2cl ve2br ve2he ve3at ve3aw ve3ay ve3bm ve3bv ve3cb ve3er ve3jf ve3et ve3gt ve3hd ve3hm ve3mt ve3wk ve3hv ve3bk ve3em ve3he ve3ae ve3ae ve4bb ve4bq ve4bu ve4cb ve4ck ve4dk ve4dy ve4gd ve4gf ve4gu ve4hr ve4ie ve4ef ve4fc ve4al vk3ml vk3vp vk5bj vk5hg vn2bg vo8j vo8s vxz4x xlaa x1ax x1n x3a x9a x9b ym2w z1laa iph yalfm

W6ALQ, Max K. Anders, 1208 Pismo St., San Luis Obispo, Calif.

aulkab aulns b7x cxljw ex7e f8aaa f8pz g6gv jldr jldt jlee jluw kalce kalem kalcq kalhr kaljr kalsp kgeg k4aop k4es k4rk k4ry k6aj k6aja k6aug k6avi k6ayy k6bmy k6boe k6bre k6ces k6cjj k6cmc k6cog k6dmm k6dv k6egd k6erh k6ett k6fab k6fec k6ir k6oa k7agl k7alt k7bde k7hs k7ox k7ox k7pq lules lu2am lu2ea lu2cu lu2da nylaa om1tb om2es om2ej pk1ae pk3bq pylff tmu vk2ax vk2br vk2hg vk2hs vk2js vk2lx vk2nr vk2ns vk2oc vk2px vk2xy vk2zw vk2zx vk3bd vk3es vk3gp vk3hl vk3js vk3lm vk3ml vk3oc vk3px vk3tm vk3wl vk3ws vk3xi vk3ax vk4fb vk4hr vk4ju vk4mf vk4us vk5gr vk5lc vk5mf vk5xk vk5yk vk6da vk6hr vk7eh vplff vxz4x x1ax x9a yalfm zci z1ab z1bh z1bz z1ci z1cu z1di z1dv z1ag z1be z1bj z1ce z1cem z1ces z1cet z1zap z1zba

W9FWW, L. H. Cook, 2048 K St., Lincoln, Nebr.

velca ve2be ve2br ve3at ve3ed ve3et ve3gx ve3he ve3jw ve4as ve4bb ve4bq ve4bv ve4dt ve4ec ve4gn ve4gp ve4hr ve4il ve4ed ve4js ve4rs ve4xn ve5ae ve5ab ve5al ve5ap ve5bc ve5bh ve5bi ve5bm ve5ej ve5er ve5dd ve5dj ve5dp ve5dq ve5dv ve5dx ve5eh ve5el ve5hp k6aja k6alm k6avl k6boe k6cab k6cmc k6ces k6cog k6exy k6dju k6dmm k6ed k6erh k6fec k6dqf k6gv celaa celah nmlnc nn7aj vk2ex vk2dy vk2hb vk2js vk21s vk2sd vk3lp vk5hg z1ieu z1edm z1dq z1wf z1zas z1zam k4acv k4nk k4ug k7aml k7atd k7akw k7bwd k7cj k7ff k7hh k7js hklida hkliaa xla xlaa x1af x1b x9a x26a x29a em1oe em2fc em2fn em2rs em8yb rx1aa f3ocb sz2r hclfg njt wfat ode xebm j4wy vxz4x lefh kn2 vplaj hb7c h1ba ex7e er3 em2 k3 k4 x1f4a nver nylaa

W8CDB, R. J. Wood, 1814 E. Colvin St., Syracuse, N. Y.

w6ach w6acl w6aeb w6adx w6ahs w6am w6aon w6aop w6atj w6awo w6awp w6axm w6bau w6be w6big w6bis w6bkm w6bpe w6bpq w6brw w6bxw w6baf w6bxi w6bzx

w6bzo w6cgp w6ej w6cul w6cix w6cnt w6cso w6cul w6cwx w6cvf w6dan w6dae w6dq w6dje w6dow w6dor w6dji w6dvv w6dzt w6duc w6dsy w6drl w6eam w6efc w6efn w6eve w6ehi w6ein w6exa w6ezm w6zza w7aat w7ajj w7ajm w7als w7art w7asy w7aum w7axg w7bnn w7bp w7bxj w7du k4aan k4rk k4kr k4ry k5aa k6boe k6ir k6dv kalhr ka2aa kfr6 em7eh em2fn hb7c ear96 earva x1a x1d x1u xlg wcl by z1aa z1ar z1zgn z1zfr z1zat z1zaw z1zce z1zet z1zag z1zby vk2dr vk2br vk5by vk7bc

VK5GR, G. B. Ragless, South Rd., St. Mary's, South Australia

7-mc. band

w1axd w1bih w1ch w1vw w2av w2bwr w2bpa w2oc w2dm w2etn w2jd w2ko w2vy w3bev w3bfa w3bhv w3che w3bbb w3md w3op w3ke w4abt w4aph w4alm w4ami w4akw w4ajj w4ajx w4ld w4kh w4wt w4zv w5aio w5aqy w5au w5ayl w5atf w5bjx w5bmi w5bau w5ec w5ef w5lv w5uo w6am w6amm w6adk w6are w6ael w6axv w6arp w6aoc w6alq w6bbx w6bjc w6baz w6bja w6bjf w6bqk w6bot w6cah w6eri w6epf w6cwx w6onm w6oss w6de w6dmq w6dyp w6dms w6diz w6ebe w6ege w6err w6efe w6exq w6erp w6eqb w6erl w6ern w6ege w6elo w7aq w7bb w7bfc w7qi w7ts w8bek w8bgt w8bkk w8cjj w8dld w8ebe w8eik w8fjn w8js w8arn w8arl w8bnh w8bvi w9cgu w9eru w9gm w9do w9um w9wj pk1ae pk1ab pk1bu pk1jr pk3bm pk3bc pk4er pk4hh jlet jleq jley jldr jldu j3df j3dh j5cc j6eb ac8rb ac8sk ac8zw ar8mo aulns aukaa au3ea hclfg ilau k4ug k4es kalhr kalmn kalsl ka9pb k6boe k6lg k6exy k6fec k6dys ve5ce ve5fi vsbag vs7ai vs7gt vs7ka vplfr vp2br vu2kh om5ea om8as hb7c om2es ok1kd ok2rm haf2c hb9h hb9q ct2ap ear94 paolm fm3db f8pv f8pz f8rj f8sh g5by g5mu zs2a zs2c at6x t6tt vxz4x obe hx8

14-mc. band

w6dfd w6ers w6oi w6te w6era w8faq w9fek pkioi pk1hs pk1pk pk1jr pk2wj pk3bm pk3bq pk4aj pk4yy vu2ah vu2jp vs3ac vs7gt vs3ae ve3bm yi6er hclfg jilec j3de j3dd j5ce k6ayd kalem g2rv g5ml g5pj f8pz f8rj f8ex ok2si ok2op pa0wr haf1g at2c gx2tm

W8DQU, Glenn A. Pattee, Bangor, Mich.

14-mc. band

w1ach w1afi w1awd w1bec w1bus w1cwt w1ced w1cjj w1cnu w1cpm w1dhd w1nc w1rw w1web w1wz w2bok w2oyr w2rs w2us w3qm w4ad w4ahh w4ajx w4ajy w4jn w5arv w5aax w5bed w5brs w5jv w5qu w5tw w6app w6bbs w6bja w6bag w6cyr w6dgv w6dwe w6efm w6fef w6fff w6il w7ayr w8akn w8fbm w9bes w9dar w9dm w9ern w9fyg velbw ve4ai ve4gn ve4hu ve4jx ve5cp k5aa em2ef em2le lu1ba x9a

W1BFT, C. B. Evans, 80 North State St., Concord, N. H.

as2ho b7x emal em2ef em2le em2ma em2jt em2mm em2ev em2wd em6op em8as em8by em8lc em8uf em8mi celai ex2bt d4xdb d3x etlaa etlcb etlig etlgt etltd etltx earst ear16 ear37 ear38 ear96 ear98 ear136 d4uah fmmq fx7c fm8er f8cha f8gi f8od f8pz f8sm g2bm g2by g2dz g2oi g5bj g5by g5ml g5qa g6gs g6rb g6vp g6xq g6yk hb7c h18x h1el ilid kdv5 kdz5 k4act k4aan k4aop k4es k4rj k4rk k4ry k4ug k5aa lu3de lu7ke nylaa on4au on4dx on4fe on4gn on4ja on4jb on4jj oa4z on4u pa0ld pa0we pylcr pyldy py2qa rx1aa sulch ti2ags ti2fg ti3la vlyb vk2ks vk2xu vk3jt vk3pp vk3pr vk3xi vk3az vk3sh vk5ml vk5kw vk5yk vk6ow vk7bc vo8ae vo8aw vo8ae vo8az vp2pa wj2

xld x5c x9a xbaa x7c x1als z12bh z4bt zsa2a zsa4a zsa6aa
z1ls

W5CCW, 747 W. Dickson St., Fayetteville, Ark.

7-mc. band

em1aa em2au em2ay em2fe em2gr em2gu em2jm em2nm
em2na em2op em2pu em2ra em2sv em2wd em3th em5fe
em6ep em8az em8yb hh7e kfr6 k4aef k4aop k4bu k4es
k4rj k4rk k4ry k4ug k5aa k5ab k5ac k6auq k7do py1ff
ti2fg ve1bw ve2ai ve2df ve3cb ve3ef ve3fa ve3hy ve3ib
ze3ij ve3im ve3jm ve3jn ve3yh ve4bf ve4ci ve4is ve9bq
vk2ax vk2ek vk2za vk2nu vk2sq vk3ek vk3gz vk3jf vk3jt
vk3tu vk3zx vk3zz vk5hg vk5rh vk6wi vk7ge vk7zi xlaa
xld xlg xlm xln x3a x5c xliaa xliak xilar x12he x3aj
x3as x3bj x3ex

Orlo Stevens, Route 1, Stillman Valley, Ill.

3500-ke. band

w1afo w1bgw w1cau w1cd w1eru w1dgw w1qpi w2ada w2ctup
w3ask w3aqm w3azi w3cel w3cerf w3om w3oy w3ji w4acs
w4adr w4am w4dm w4tmb w5awe w5aue w5ast w5btt
w5bqx w5dw w5je w5tp w5yh w5zld w8abq w8ady w8adx
w8anr w8ajg w8allw w8alq w8aud w8aun w8ax w8bnx
w8bja w8bre w8cfr w8ema w8epa w8ere w8oue w8cuu
w8cwa w8ewk w8dem w8deq w8dk w8dm w8dro w8eca
w8eft w8efg w8eic w8emk w8eto w8fdy w8ffg w8fi w8fl
w8fm w8fpw w8fka w8fku w8fga w8gak w8hesw w8le
w8qe w8qt w8zo w9aar w9abk w9aci w9ago w9aiq w9ak
w9amnt w9ar w9art w9art w9arz w9auk w9bao w9bdi
w9bnm w9bbs w9bod w9bp w9bqp w9bqt w9brx w9btl
w9bub w9by w9chs w9cda w9ceq w9ceg w9chq w9ciu w9cjr
w9ckm w9ckz w9clm w9cmn w9cna w9cou w9eji w9esb
w9eox w9ext w9fa w9fae w9fau w9fbu w9feg w9ffg w9ffy
w9fgx w9foa w9fra w9fv w9fkk w9fy w9fye w9gas w9gbe
w9ges w9gtd w9gw w9gxi w9gy w9hag w9haji w9haq
w9haz w9hek w9hia w9hiu w9hos w9hpk w9hqt w9hsq
w9hsy w9hsa w9hsz w9htd w9hui w9hya w9icd w9ji
w9jixy w9jrx w9ok w9qrp w9qt w9qy w9uka w9zbr w9zik
w9zst w9zsq w9ztt

1400-ke. band

w1atm w1axa w1bhq w1endo w1na w1kw w1ox w2agq
w2bro w2bru w2cda w2cd w2jx w2dj w2jt w2mb w2qs
w2wx w3afu w3ced w3cep w3ds w4ale w4aax w5abo w5ddr
w5dnx w5dm w5dqy w5brj w5fdm w5aie w9cfa

7000-ke. band

w1asa w1aqy w1cvi w1cix w1dqj w1ga w1ja w1wk w2agq
w2ail w2akw w2baaj w2brp w2ddd w2dfu w2dha w2otl
w3enn w3da w3qe w4add w4adu w4alu w4anf w4ano
w4ar w4ax w4ddr w4eg w4fn w4to w4ud w5aa w5aak
w5abu w5aca w5aes w5add w5adf w5adhe w5adq w5acy
w5aks w5anr w5am w5app w5aqa w5aqe w5aqj w5aak
w5ayf w5bqo w5bqr w5bx w5bsp w5caa w5cw w5car w5ere
w5eu w5de w5dd w5dqe w5dos w5dyj w5gpe w5im w5lx
w5ohl w5ow w5paw w5ref w5rgf w5rw w5saw w5tun w5xxc
w6ags w6ahd w6an w6aru w6bby w6cad w6cal w6cg
w6der w6dow w6duo w6dxr w6exq w6fer w6lew w7ata
w7dpo w8aap w8aja w8at w8aup w8cdg w8cgr w8cfe
w8cjo w8cnu w8ded w8der w8did w8dzg w8eat w8exd
w8fel w8fig w8fkg w8fkl w8hgd w8nl w8pg w8rk w8eut
w8epu w8eru w8enq w8evm w8ffy w8fpd w8fpq w8fgo
w8frd w8gqo w8hek w8hgn w8hta w8htu w8ia w8kg em1na
em2asf

W8EUY, R. W. Collins, 90 W. Main St., Ripley,
N. Y.

3500-ke. band

w6awo w6bxc w6cnd w6dyj w6ekh w6fgy w6rj w7ain w7aiu
w7aoh w7axt w7axy w7bev w7blj w7ql ve5ae

7000-ke. band

em1zo em2af em2fe em2jm em2lj em2op em2rs em2sv
em2na em2wd em6bx em6ep em6ag em8az ear10 ear16 ear74
ear86 ear96 ear136 ear187 ear200 ear224 ear227 f8pz
fm8ih k4aef k4aep k4aop k4es k4ke k4rj k4ry k5aa k5ab
k6arb k7ff helfg hkk ny1aa ti3fg ti3mf ve4ad ve4ag ve4ci

ve4el ve4ft vk2ar vk2me vk3bh vk3ek vk3gb vk3rj vk3xi
vk3zb vk6wi vk7ch vs7ai w6acl w6afi w6awo w6bau
w6bfa w6blz w6bpj w6buw w6bxf w6byj w6cgw w6emp
w6eco w6epj w6eqf w6dak w6dde w6dfu w6dia w6dob
w6dkv w6duo w6ebe w6ege w6eme w6enn w6exq w6eal
w6faa w6fel w6ffw w6mv w6zso w7alz w7ayr w7bb w7bor
w7jb w7kg x5c xx5aa xliaa x3ax x3ec x3ci

Newton Johnston, 19 Ware St., West Somerville,
Mass.

3500-ke. 'phone band

w4aad w4alx w4ani w4abn w4amq w4acr w4acy w4asu
w4ase w4afq w4azm w4acz w4aus w4axs w4hn w4ajn
w4lu w4ib w4bam w4apw w4be w4fa w4kx w4mu w4tr
w4qz w4lu w4tm w4wc w4uh w4ws w4zf w5ajo w5ais
w5avt w5boo w5bqx w5awe w5anw w5btt w5bpl w5pp
w5id w5qj w5yh w6abf w6cqi w6cgi w6fdn w6coe w6ean
w7aqx w7bei w7ant w7aqj w7apd w9aik w9acr w9auy
w9acz w9axs w9fax w9buy w9bbu w9bqc w9bai w9bky
w9bpt w9bei w9bug w9bh w9bqp w9bde w9dqs w9cna
w9cam w9caj w9cns w9cex w9ors w9djh w9dkh w9dxi
w9dtp w9dad w9dwl w9dqp w9edl w9eod w9etq w9edw
w9etd w9exj w9eo w9eat w9eal w9ehd w9flf w9gij w9gah
w9gkv w9ghx w9gmf w9gju w9hga w9iu w9fz w9feg
w9fke w9gs w9gxi w9gku w9gkx w9hyo w9hyo w9hjh
w9gqf w9imi w9ky w9niq w9ph w9ya

14,000-ke. 'phone band

w1axa w1bvl wlio w5aej w5abo w5ql w6aj w9ez w9ejj

W2CKR, Edwin J. Sahn, 2390 Davidson Ave.,
Bronx, N. Y.

14-mc. band

em2ef em2jt em8as ct1aa ct1bx ear96 ear185 ear224
f8wb g2vq g2yd helfg k4rj k5aa oa4u oa4z on4gn paell
ve4dk ve4gu vo8aw vo8z vp2pa w6adp w6ahp w6api
w6awo w6azu w6bam w6bbz w6bif w6bja w6bkm w6bse
w6bux w6bvx w6cal w6cbp w6ckr w6ctd w6dam w6dlp
w6dio w6djv w6dk w6efr w6ein w6eqb w6eig w6exq
w7axx w7ayj w7ayr w7bmr w7pk yv2av

14-mc. 'phone band

w6aj w6fam w6zh

William Lando, 39-12 103 St., Corona, L. I., N. Y.

14-mc. 'phone band

w5abo w5aej w5ga w5mk w5pl w5nb w5enu

3500-ke. 'phone band

w1akd w1auy w1avk w1bes w1bic w1br w1erw w1ewh
w1dlj w1dly w1d w3aim w3als w3bms w3bmz w3bqb
w3ce w3oy w3zj w3zy w3tk w3ub w4acs w4aad w4amb
w4alx amj w4ams w4aus w4awt w4ld w4pw w4tm w4zf
w5abo w5aef w5ape w5aci w5agx w5bma w5ahf w5aou
w5arw w5bae w5bfl w5bfd w5bxy w5cer w5coa w5cla
w5cpl w5cpl w5cut w5dee w5dfv w5dia w5elf w5ih w5ne
w5nx w5rs w5wi w5wf w5ani w5adk w5aeq w5bbu w5bde
w5bei w5bhm w5bpt w5buy w5bdw w5cga w5che w5ciu
w5dmx w5cep w5dod w5drs w5dzm w5ehg w5enf w5ewx
w5fqu w5gax w5gqf w5hbb w5he w5iu w5os w5jr w5yh
w5yi w5zab

1750-ke. 'phone band

w1bbe w1ber w1cjr w8bri w8io

W8ECF, Donald E. Schryver, 742 Morrison St.,
Watertown, N. Y.

3500-ke. 'phone band

w5aha w5amx w5aqv w5aun w5bez w5bth w5bak w5cey
w5jk w5sz w6aby w6aif w6ajp w6awo w6bee w6bls w6bvn
w6bxc w6cjs w6clp w6clr w6dbg w6dww w6dyj w6dzm
w6ert w6efd w6evq w6fgt w6imn w6in w6yau w6yu w7ain

*W6CUZ, William F. Erdman, 17 Wilkes Circle,
Santa Cruz, Calif.*

(December 5th-January 1st)
7000-ke. band

Lieut. Earle F. Cook, Fort Amador, C. Z.

7000-ke. band

w1afs w1cve w1cwn w1dci w1me w2abe w2ail w2amr w2bhy
w2bst w2bvj w2bmo w2onb w2rp w3afq w3aki w3apn
w3ars w3bbb w3cni w3ecf w3md w3nt w3oq w4abi w4abz
w4add w4afe w4akh w4aki w4all w4anz w4aqd w4asi w4aur
w4bab w4dda w4dd w4dtr w4dw w4eh w4fp w4ft w4hr
w4jn w4la w4ai w4tu w4ue w5abq w5adn w5ah w5aso
w5bdd w5bbs w5bry w5caw w5ceb w5dvw w5qy w5vv
w6bfe w6cxn w6dqe w7ac w7bjc w8aa w8bbq w8bid w8bis
w8bi w8blt w8bqt w8cbq w8cu w8eu w8bn w8lt w8rj w8ai
w9aqy w9avn w9bow w9bsu w9eut w9eyf w9lf w9mc w9mh
w9nk w9ug w9uz w9yc cm2mm cm8az ear185 k4aop
k4ku k4ke k4rj k5ab z14 khk (phone)

Rex Ackley, 1063 Market St., Sunbury, Pa.

3.5-mc. 'phone band

w1aah w1aby w1ad w1aah w1avk w1ay w1ays w1bbg
w1ber w1bco w1bco w1bjn w1bly w1brn w1bab w1bwv
w1bz w1cga w1crw w1cwg w1gw w1ld w1nk w1bpf w1dbe
w1cam w2aeg w2aer w2ahn w2ahu w2aih w2ain w2alc
w2alu w2aoe w2aqv w2art w2ate w2aal w2bec w2bec
w2bhy w2bmz w2bqv w2brw w2bed w2bub w2bwg w2bxo
w2bzf w2bzm w2bwr w2bbe w2odp w2cfd w2eif w2okw
w2cmh w2coj w2cpi w2eql w2csw w2evk w2cwf w2cxx
w2cyp w2dei w2fi w2fr w2go w2cwn w2ft w2bwm w2hap
w3abn w3ac w3ac w3adq w3aer w3aev w3atr w3aha w3ah
w3ahh w3ain w3alq w3als w3ama w3ap w3apk w3aq
w3ar w3act w3aqv w3aqs w3av w3avl w3bac w3bac
w3bbo w3bec w3bec w3bec w3bd w3beb w3bes w3bfs
w3bbh w3bj w3bjh w3bke w3bl w3ble w3blz w3bmz w3bcb
w3bj w3br w3brd w3brs w3brx w3bes w3bsu w3bul w3co
w3cef w3eue w3dl w3der w3fh w3gl w3je w3mp w3nu w3ga
w3ag w3uk w3wf w3wn w3ay w3aj w3a w3zu w3aum
w3je w3bbg w3bms w3btp w4aad w4abn w4ad w4ads
w4aet w4afq w4agi w4ajn w4asu w4axh w4axv w4el whn
w4lj w4lb w4km w4lu w4um w4oa w4oe w4qf w4sq w4tm
w4as w5abo w5aeg w5ajo w5ali w5anw w5anw w5atb
w5awp w5azv w5bas w5abf w6awc w6bjz w6cjq w6cxg
w6cs w6clw w6cub w7ahn w7aqx w8aaf w8aat w8aci w8aeg
w8aeo w8agu w8agv w8ahg w8ain w8aif w8ajd w8aku
w8akw w8alp w8als w8als w8amw w8amy w8ang w8anp
w8aoe w8aol w8aqw w8ari w8arw w8asb w8aso w8atr
w8att w8aua w8auk w8avb w8awg w8awq w8awv w8axh
w8ayg w8ayj w8ayk w8azb w8az w8bab w8beb w8bg
w8bhq w8bju w8bmq w8bnr w8bog w8bof w8bos w8bpw
w8br w8bu w8bu w8bup w8bwg w8bw w8bwq w8bxb
w8byr w8caw w8dgg w8edh w8odw w8eca w8eer w8ecx
w8efd w8cfu w8chp w8chr w8cht w8chu w8cia w8cjp w8cln
w8cma w8cmf w8cmk w8cms w8cne w8con w8cpj w8con
w8cti w8cta w8ctt w8cul w8cuq w8cuv w8ovw w8cwa
w8cyl w8cym w8cyy w8czu w8czv w8dbf w8dbq w8dcy
w8ddw w8dee w8dfv w8dgg w8dgt w8dif w8dil w8diy
w8dji w8dlm w8drh w8dte w8dtk w8dul w8dvg w8dxa
w8dyy w8eay w8ebe w8ecp w8eej w8ceo w8ceu w8cee
w8efd w8egj w8ehr w8cht w8cic w8eif w8eiv w8ejm w8ekp
w8eka w8ekz w8elf w8emh w8emm w8epv w8erm w8esn
w8ete w8efv w8efy w8eww w8evl w8exn w8eyk w8eym
w8eyn w8fay w8fcf w8fcs w8fee w8fej w8fef w8fif w8ih
w8iy w8ne w8nx w8oj w8fl w8rw w8ua w8wf w8tt w8bfd
w8cqr w8chp w8bri w8arl w8cpl w8dgg w9aa w9ark
w9aaf w9bbr w9bde w9bei w9bhm w9aju w9cmp w9cms
w9cns w9csp w9cvd w9ces w9idd w9idd w9dpy w9dtp
w9bbs w9edw w9ehd w9eod w9esl w9etd w9etq w9evr
w9ewc w9ewd w9fl w9fke w9fay w9faj w9bgg w9ghx
w9gim w9gku w9gs w9gzy w9hco w9hgl w9hke w9ky
w9ine w9pa w9ax w9ya w9wl w9bbe w9caj w9cfd w9cgm
w9edw n20 w4ama w4as w4dl w4pb w4aa w4aal w4ag
w6dyj w6fbb w7and w7atv w7blj w7bke w9aj w9and
w9anq w9arx w9bbl w9brv w9ddu w9ddy w9dhj w9dqo
w9fdb w9fqc w9hxx w9hvj w9htq w9hty w9hve w9vh
w9dvv w9gvs w9brh w9gyb w9cms w9coe w9art w9gfu
w9fbu ve2bb

ac8go ac8sk ac8jk cm7sh c2kw cm8sz cm2na cm2fn
cm2gu cm2et cm2ed d2fs hbt7c j1ee j1ek j1dm j1dn j1do
j1dt j1et j2ds j3dl j3dt j3tr j3di kahlr kalg kalem kanlr
kalaz kalrt kalp kalup kalpr k4es k4kd k4rj k4afc k4af
k5na k6avl k6akm k6ajr k6ero k6aop k6ana k6qas k6dv
k6fex k6ir k6bmy k6boe k6bal k6eog k6alm k6emr k7pq
k7ff k7alt k7apr k7auq k7atd k7ark k7bde lu5ar omith
omfo om2tg ve2dm ve2fd ve3pf ve3cf ve3gh ve3gl ve4eh
ve4kj ve4fl ve4dj ve4ix ve4dy ve4ci ve4iu ve4ai ve4dk
ve4es ve4ih ve4it ve4hx ve4dy ve4qp ve4eq ve4ec ve4ac
ve5ew ve5eo ve5em ve5al ve5eg ve5dv ve5cf ve5be ve5ev
ve5ad ve5ei ve5es ve5af ve5he ve5fh ve5fd ve5cx vk2ux
vk2nb vk2af vk2px vk2bh vk2br vk2nm vk2ha vk2fb
vk2na vk2fo vk2hg vk2jt vk2ra vk2cd vk2vv vk2xr vk2ve
vk2kl vk2mo vk2rm vk2nd vk2rq vk2fq vk2oc vk2ps
vk2hd vk2wu vk2ov vk2fs vk2jo vk2ou vk2fn vk2ba
vk2hk vk2dr vk2nr vk2hg vk2hl vk2aa vk2px vk2go
vk2dm vk2hc vk2ra vk2gr vk2eg vk2ok vk2fk vk2br vk2jc
vk2ja vk2yj vk2df vk2lx vk2xg vk2dn vk3rs vk3rj vk3ka
vk3ew vk3su vk3ju vk3wt vk3wx vk3sy vk3sz vk3ie
vk3jw vk3xt vk3yt vk3bj vk3vl vk3wu vk3me vk3oc
vk3nm vk3la vk3bl vk3gu vk3bx vk3gj vk3gr vk3or vk3iv
vk3ws vk3wb vk3ek vk3sa vk3tm vk3jr vk3wo vk3gx
vk3ou vk3jt vk3aj vk3vy vk3hk vk3as vk3wb vk3mb
vk3ee vk3nr vk3hq vk3cl vk3ab vk3qb vk3lq vk3pr vk3as
vk3gp vk3dl vk3jk vk3lr vk3pf vk3ka vk3ou vk3wa
vk4pk vk4ea vk4ar vk4wa vk4vj vk4wx vk4fb vk4ju
vk4em vk4ui vk4hs vk4ou vk4bj vk4am vk5my vk5ux
vk5hg vk5iu vk5hu vk5pk vk5lj vk5wi vk5ny vk5iy
vk5xk vk5al vk5aw vk5rh vk5ew vk6ge vk6tr vk6wf
vk6aj vk6ba vk6er vk6fh vk6lj vk6fl vk6ng vk6ov vk6wi
vk6jt vk6gw vk6su vk7gx vk7rj vk7hc vk7bc vk7fh vk7ew
vk7ch vk7ll vk7wm vk7hs vk7ge vk7qg vk7qg xla xlr
z1lbw z1fza z1lak z1lar z1ler z1ek z1lmk z1lgc z1lag
z1lab z1lrq z1laq z1laa z1d3g z1b2c z12jk z12ab z12ao z12go
z12bb z12bi z12dq z12fz z12gc z12ac z12ab z12ci z12ar
z12ew z12as z12si z12bl z12fi z12ab z13dn z13gq z13et z13cc
z13th z13da z13as z13aq z13bl z13bj z13cm z13cs z13cu z13cg
z13rm z13a z13ab z13a z13bb z14ao z14aq z14bl z14bg z14g
z14bt z14h z14ld vax4x ex7c vs3ac vs6ah kvei kgeg vbd
vbm h8x vplff bx by nlnic

14,000-kc. band

cm2gr cm2lc cm2wd cm2mm cm8bc hc1gf hh9g k4rl k5aa
k6brc k6dvz k7anq lu2ea lu2fm lu3fa oa4u oa4j ce7da ti2fg
py2aj py2aq py2ax py1ff velyb ve2df ve2ch ve3al ve3ag
ve3ag ve3ig ve3ab ve3fj ve3fa ve4vv ve4bz ve4au ve4jx
ve4gk ve4ld ve4fo ve4ic ve4dt ve5fg ve5cp ve5ff ny1aa x9a
x1aa x9aa x1b

W5AUX, W. L. Ratisseau, Jr., 3812 Ave. P,
Galveston, Texas

7000-ke. band

vk2ad vk2av vk2ba vk2bj vk2br vk2hq vk2lk vk2oe
vk2tz vk2vg vk3ca vk3hk vk3nm vk3oc vk4ju vk4wo
vk5gr vk5hg vk5iv vk5it vk5jm vk5mb vk5ml vk5pk
vk5wi vk5wr vk5x vk6bo vk6b vk6c vk6j vk7ge vk7jp
zl2ee zl2ej zl2gd zl4ao cm1by cm1nn cm2ef cm2ic
cm2jm cm2lc cm2ma cm2pa cm2wd cm2sa cm2xa cm5ea cm7ah
cm8lc ve2bb ve2ue ve3be ve3bm ve3bj ve3bv ve3ef ve3ep
ve3dy ve3lh ve3ib ve3iy ve3ix ve3ji ve3kj ve3ll ve3pe
ve3rf ve3ra ve3tt ve3wk ve3wm ve3ad ve3ag ve3qg ve4bu
ve4cv ve4dt ve4le ve4ef ve4ex ve4gi ve4go ve4vg ve4jb
ve4je ve4er k4rk k4ry k4ac k4ao k4db k4ib k4np k4yd
k6agi k6aaj k6agq k6avl k6bgh k6boe k6cab k6cb k6cd
k6cib k6dmm k6dva k6egd k6ene k6erh k6lee k6lcm
kalhr kaljm kalzl ka9pb x1a x1d x1g x1n x1aa x1ac
x1ax x9a x9b x2sa x26a x27a x29a ear116 g5by hraaa j1et
jdxo k7ox nj2pa om1tb rx1ao kd5v kfr6 55k 55x xba1 xebm
xzu xa8a

(Continued on page 82)

• CORRESPONDENCE •

The Publishers of QST assume no responsibility for statements made herein by correspondents.

More Supposing

Summit, N. J.

Editor, QST:

I have perused your editorial "Just supposing" and the dope on Madrid, particularly in regard to 56 megacycles. Very shortly I am afraid we are going to need more room on this band — and I do not think it is a supposition either. N.B.C. has a 61-mc. station now and they will be close on the 56-mc. side before long.

We old-timers on 56 mc. (3 months — hi) are doing a great deal of preparatory work for long distance duplex transmission using five meters as you would a wire line. Three of us can now retransmit 20, 40, or 80 on 5 and vice versa with perfect ease. This work is carried on with 20-meter 'phone, chiefly on account of good signals without local QRM at night. We are working with the Kansas City gang and expect to have duplex with four fellows (or should I say quadruplex?) with all four able to listen or talk simultaneously. I don't think it will take many such demonstrations to arouse as much interest as those first QSO's with F8AB on 110.

What I want to suppose is this, that within a year, or possibly two years, any amateur in this country can communicate duplex with any other amateur at any time of the day or night by a judicious selection of duplex relay points and frequencies. The possibilities are large enough to suppose for many hours, but as I see it the only drawback will be QRM on 56 mc. No doubt the art will progress so that we will not wobble so badly, with the result that we will be able to put more stations on than would be possible at present. However, the super-regenerative receiver is broad and the only other possibility is the super het, which because of cost and difficulty of construction is not very practical for the average amateur. In other words, I am wondering if it would not be a good idea to ask for an increase to include everything from 50 to 60 mc. Very shortly I expect we can show use for it, and it ought not cost very much to ask.

— D. A. Griffin, W2AOE

108 Water St., Boston, Mass.

Editor, QST:

We are hearing a good deal lately about certain amateurs being fined for operating without licenses or having their licenses suspended for operating outside the band limits, but we have

yet to hear of enforcement of the regulations concerning unnecessary interference or the use of unrectified a.c. for power. In my opinion these two conditions are becoming much more of a serious menace to successful operating than anything else. With our bands becoming more and more crowded every day it is essential that something constructive should be done to remedy these unnecessary evils.

Undoubtedly a great portion of unnecessary amateur interference is thoughtless and comparatively little is really wilful or malicious. Call it what you wish, however, the interference is present and is certainly deadly. I believe it could be very largely reduced by educating the individual amateur to the seriousness of it and furnishing him with detailed instruction how to avoid it. I am referring primarily to the kind of interference caused by the average amateur when he first goes on the air, checking his note for quality and wavelength. Once a transmitter is in proper operation there should be little necessity for rechecking for quality of note, and with a little care and thought checking for wavelength can be made in a second without any necessity for making the objectionable long series of dots and dashes. If frequent changes in parts or adjustments are to be made, necessitating frequent tests, they should of course be made with antenna disconnected and using a monitor.

There is another kind of interference which is absolutely unnecessary; namely, the kind resulting from thoughtless jangling of one's key. There is scarcely an operator to-day who cannot quote hundreds of cases where he has either been made to repeat traffic or lost contacts through the thoughtless jangling of some other operator's key. It would almost seem as if there was a certain type of operator who takes fiendish delight in holding down his key for long periods of time or making long series of meaningless dots and dashes for unknown purposes, and peculiarly enough he always seems to have a transmitter with an unrectified power source which results in such frightful see-sawing hash that all operation near him is hopeless until he has finished. In certain cases I have been able with patience to contact such operators and have found invariably that they had no realization whatever of the QRM they were making, and had on first thought what seemed to them a legitimate excuse for such tests. On second thought they realized that with ten or twenty other operators similarly thought-

R. E. L.
R. F.
R. E. L.

T-5100
\$7.50
T-5101
list \$1
Thord
butto
3020 —

A real
Relay
double
large
It is id
power
V. A. C.

Compl
stance
with a
your r

Sprague

denser

Concour

denser

Aerovox

denser

Aerovox

denser

Aerovox

conden

Aerovox

conden

Leeds 50

base.

R. E. L.

R. E. L.

R. E. L.

6" leng

R. E. L.

6" leng

G. E. 12

bulbs.

G. E. 12

bra bas

G. E. 2 w

American

Leeds desl

Leeds floo

Murdock

Brandes h

Murdock

Baldwin t

Sangamo

Aerovox

working

Erpees fea

ohms, L.

G. R. T.

334V — 50

334T — 10

Acme varia

Crystals,

frequen

Oscillatin

side th

Crystal

\$10 preci

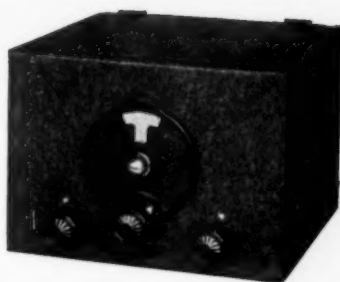
Airplane



LEEDS

Still Leads
with the two
LEADERS
in Amateur Receivers

Get our wholesale
Prices First



R. E. L. NO. 278 BAND SPREAD RECEIVER

R. E. L. 132 transmitting R.F. choke	\$.65	R. E. L. 250-A transmitting R.F. choke	\$.75
R. E. L. plug-in base	.72	R. E. L. plug-in coil forms	.72

T-5100 — Thordarson — 245 plates to class B 210 grids; list \$7.50, Special	\$4.27
T-5101 — Thordarson — Class B 210 plates to 5000 ohm load; list \$10.00, Special	5.70
Thordarson Microphone Transformers T-2357 — Single button to match all microphones, special	2.28
3020 — Double button mike, Special	4.00

A real buy in an A.C. operated Relay that does not chatter; double pole, single throw with large contacts, 1/4 inch throw. It is ideal for keying or remote power control. Operates on 2 1/2 V.A.C. Only.\$2.45

At Last a Band Spread Monitor Frequency Meter employing 250 tube; electrostatically and magnetically shielded in a crystalline finished steel box, with an easily removed cover; 80 division spread on 80; 35 on 40 meters; 20 spread on 20 meters.\$9.95

Complete information on Bleeder Resistance sizes now available together with a full line of H. & H. units to fill your requirements, at lowest prices.

Sprague 5 mfd electrolytic condensers	\$.70
Concourse 8 mfd electrolytic condensers	.50
Aerovox 4 mfd electrolytic condensers	.85
Aerovox 8 mfd electrolytic condensers	1.15
Aerovox 8-8 mfd electrolytic condensers	2.20
Aerovox 8-8-8 mfd electrolytic condensers	3.10
Leeds 50 watt socket, porcelain base	1.50
R. E. L. 50 watt socket	1.60
R. E. L. 250 watt mount	3.40
R. E. L. type S inductance 3" dia, 6" length	3.30
R. E. L. type L inductance 3" dia, 6" length	3.30
G. E. 1/2 watt and 1 watt neon bulbs	.55
G. E. 1/2 watt neon bulb candleabra base	.55

Flechtheim Condensers at a Special Price. Pyrex Insulators — 35% discount on list

Large Assortment of Weston and Jewell Meters at Wholesale Prices

Siemens & Halske high voltage transmitting condensers at 40% off list price

LEEDS will not be undersold. Write for our quotations

G. E. 2 watt neon bulb standard base	\$.75
American microphone model CD, \$23.00	11.75
Leeds desk microphone stand	2.75
Leeds floor microphone stand, adjustable type	6.75
Murdock 2000 ohm headphones, per pair	1.45
Brander headphones, per pair	1.25
Murdock 3000 ohm phones, per pair	1.95
Baldwin type "C" phones, per pair	4.75
Sangamo 5000 volt condensers, All sizes, each	1.10
Aerovox 1 mfd oil immersed filter condensers, brand new, working voltage 3500 volts, D.C. (limited quantity)	12.00
Ereps featherweight phones — extremely sensitive; 4000 ohms, List \$8.00 per pair	1.95
G. R. TRANSMITTING CONDENSERS (Double Spaced)	
334V — 50 mfd	\$2.50
334T — 100 mfd	2.75
334Z — 500 mfd	10.00
Acme variable ratio transformers	\$7.00

LEEDS Crystal Control Equipment

Crystals, Y cut, guaranteed within 1/10 of 1% of specified frequency, in 160 or 80 meter band	\$4.50
Oscillating Crystals, Y cut, completely finished, just outside the 80 meter band	2.25
Crystal holder, dustproof usually \$2.50, Now	1.95
\$10 precision type	3.45
Airplane type Mercury column thermostat at 1/4 °C; set at 55°C	5.00

NATIONAL SW-3 HAM RECEIVER

Complete line of national parts in stock. — Coils from 9 to 2000 meters for S.W. 3 and S.W. 5 are now available.

HERE IT IS! A complete line of TRANSFORMERS for Class B audio amplifier employing a 227, two 245s, and two 210s in the output stage. Built by Thomaston Labs., these units will give you an amplifier that is flat from 100 to 5000 cycles, with tremendous output obtainable only with this type of amplifier.

245 plates to Class B 210 grids	List \$14.00	40%
Class B 210 plates to 5000 ohm load	List \$17.00	40%
	List	Net
R. C. A. UV 712 transformer 9 to 1 ratio	\$7.00	\$1.75
Acme 30 K.C. transformers	5.00	.69
Acme .1 henry choke coil	4.00	.39
G. R. 369 98 henry choke coil	5.00	.69
Sangamo type AX 3 to 1 audio transformer	6.00	1.20
Mesco spark coils	6.00	.50
Bunell spark gaps	5.00	.40
Esico 80 watt soldering irons	3.50	1.95
Songbird .00025 variable condensers with removable shaft	3.00	.25
Silver-Marshall 277 R.F. choke	1.50	.85
Cardwell Cond. 153-B .00035 cap., special	4.75	1.50
Special prices on all Cardwell condensers		
Flechtheim T-200 2 mfd 1500 volts D.C.	8.00	4.25
Flechtheim TC-200 2 mfd 1000 volts D.C.	6.50	3.50
G. R. 277 coil forms	1.25	.35
G. R. 30 K.C. transformers	5.00	.95
G. R. matched kit of 3-271 and 1-331	20.00	3.75
G. R. 285-H 6 to 1 transformer	6.00	1.20
G. R. 285-D 2.7 to 1 transformer	6.00	1.20
G. R. unwound vario-coupler form	2.00	.65
G. R. 391 220 each side of C.T. 2-5 volt winding one center-tapped	8.00	1.95

REPLACEMENT BLOCKS AND TRANSFORMERS FOR ALL STANDARD SETS. LET US QUOTE ON YOUR NEEDS

2" inductance No. 16 D.S.C. wound on celluloid, space wound, per inch	\$.25
3" inductance No. 16 D.S.C. wound on celluloid, space wound, per inch	.30
Amplion hand mike, list \$25.00, net	4.45

To meet the demand for a good popular price filament transformer we offer the following at special prices

Leeds 25 V.A. — 2 1/2 volt — center tapped at 10 amps for receiver filament	\$1.25
Leeds 45 V.A. 7 1/2 volt center tap winding at 7 amps	3.95
Leeds 45 V.A. 2 1/2 volt center tap for 866 tubes at 10 amps, 10,000 volt insulation	3.95
60 V.A. 2-7 1/2 volt center tap winding at 4 amps, each	6.25
70 V.A. 3-7 1/2 volt center tapped windings at 3 amps	3.50
75 V.A. 10 volt center tapped windings at 7 1/2 amps	5.25
85 V.A. 12 volt center tapped winding at 8 amps	5.25
85 V.A. 14 volt center tapped winding at 8 amps	7.50
Ward Leonard 10,000 ohm 40 watt, 5 1/2" long x 1 1/2" diameter	.75
Ward Leonard 10,000 ohm 75 watt, 5 1/2" long x 1 1/2" diameter	1.25
H & H A.C. filament C.T. resistor 2" x 1/2", 30 watt 100 ohm	.60
H & H filament voltage drop resistors, 1 ohm unit	.60
H & H filament voltage drop resistors, 2 ohm unit	.60

Remember LEEDS is Headquarters for 56 MC

Receiver kit described in July issue, only	\$14.75
Completely wired and tested 5 meter receiver built under the supervision of W2AOE	22.00
Push pull X Mitter kit described in the G.R. Experimenter	18.50
Completely wired and tested	24.50
Cardwell 411 B split stator double spaced Trans. Cond.	2.16



45 Vesey Street, New York City
New York Headquarters for Transmitting Apparatus
WHEN IN TOWN VISIT OUR STORE

MAIL ORDERS FILLED SAME DAY
10% Cash
Must Accompany All
C. O. D. Orders

Say You Saw It in QST — It Identifies You and Helps QST

BACK COPIES OF QST

In recent issues of **QST** we have given space to the available back issues of **QST**. As a result we have experienced an unprecedented demand for them. We now bring the list up to date and again present it. The stock of many of the issues listed below is very low in number and it is suggested that you act promptly.

Future issues of **QST**, too, will be of greater value to you if you have these copies for their back-issue references.

1923 — Only May and November issues	\$.50
1924 — Only November and December issues .....	.50
1925 copies (except January, March, May and July)	2.00
1926 copies — complete	2.50
1927 copies (except January and July)	2.50
1928 copies (except January, February and August)	2.25
1929 copies (except March and May)	2.50
1930 copies (except January and February)	2.50
1931 copies — complete	2.50

Single copies 25c each

Complete set of copies as listed \$12.00

All quotations include postage

New binders to keep these files in order are \$1.50 each, postpaid. See page 83 this issue.

Each binder holds 12 issues of **QST** and index, and does not mutilate the copies.

**AMERICAN RADIO
RELAY LEAGUE**
West Hartford, Conn.

less the resulting QRM is something that makes operation for the rest of us not only a burden but well-nigh impossible.

The regulations have been interpreted to ban forever the use of what we all know as the r.a.c. note, but it is evident to anyone who listens on any of our bands that it still survives in surprising numbers. The Government inspectors are at present very busy policing the limits of our bands for off-band violators, but there is coming a time in the not very distant future when they will extend their investigations within the bands and then, you r.a.c. band-hogs, look out! We have groaned in anguish every time we have heard one of your five-station-broad, DX-defier, hack-saw notes and we won't be sorry to see you wiped out. You have had over a year and a half to buy yourself a filter or to put in a crystal, and it's time you went the way of the spark set — to the junk heap. It's a matter of necessity to get rid of you. It is putting a premium on higher power, and yet every new high power station just makes the situation worse.

If we are ever going to solve our interference problems we are going in the wrong direction. Progress points towards better notes and lower power. If we were all restricted to say 100 watts input it would put a premium on building efficient transmitters instead of the tendency as we have it to-day where an inefficient transmitter can be made to get out merely by increasing power and blasting its way through. Add to this a requirement that all stations must use crystal and there will be room for everyone to be heard. Witness the situation in England. There they have just those restrictions — low power and crystal. They work the world without difficulty with inputs under ten watts. If a group of roughly 1500 English hams agree that it is for their best interests to do this, such an argument certainly applies even more strongly here where there are over 20,000 of us. It is really a matter of self-preservation.

— Miles W. Weeks, W1WV

What Say, 'Phones?

Concord, N. H.

Dear Mr. A.R.R.L.:

I have been listening in on my one-tube static inhaler, and have been trying to find out what the following mean:

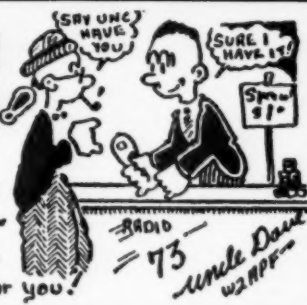
hi-diddle-de-dit
do-do-de-dum
hi-diddle-diddle
do-de-do
diddle-de-do-de-do
hi-ho-diddle-de-dit
da-de-da
dum-dum-de-dum— (dumb-dumb-de-dumb)
de-da — de-da-de-da-de-da
de-de-de-da-de-da

I have been wondering whether the above are revamped college ballads or Amateur Fraternity Yells.

— From the boys way up in Con — Cord, N. H.
P.S. — Hi-diddle-de-dit???

UNCLE DAVE

356 Broadway Albany New York
We buy, sell and trade Ham stuff!
24 HOUR SERVICE SHIP ANY PLACE
We have not got it we will get it for you!



HERE'S THE LATEST ARSCO ACHIEVEMENT! — Crystal Ovens

TEMPERATURE CONTROL OVEN, complete with crystal, ground to specified frequency, adjustable moulded bakelite crystal holder. Crystal ground to 0.1 of 1% of frequency you specify. OVEN will maintain temperature within 0.3 to 0.5 of a degree. Leave it on all the time to insure absolute crystal frequency constancy — costs 15 cents to run a month. **ALL READY TO GO. \$13.35!**

LOOK AT OUR SPECIALS THIS MONTH

NEW PHONE BAND CRYSTALS!
Crystals ground to any frequency you specify also the new 3900-4000kc. fone band. Complete with moulded bakelite, dustproof, adjustable holder—extra special! \$4.50
Your present phone crystals exchanged for new bands 2.00
Your pet crystal ground to any higher frequency 2.50
Arasco finished and oscillating crystal blanks, guar. 2.50
Arasco unfinished blanks, guaranteed 1.50
Arasco bakelite, dustproof, adjustable, crystal holder .89
Arasco, same as above, but plug-in crystal holder 1.15
Arasco commercial, precision, plug-in crystal holder — beautiful job (G.R. plugs and jacks) 1.50
Genuine Roller-Smith Radio Frequency Ammeters 0-4 and 0-6 Amperes, each 2.89
Power transformer, Arasco, with voltages: 375 each side of C.T., 2-7.5 volt C.T. filament winding, 1-2.5 volt 12 amp. C.T. winding, special 5.00
Power transformer, Arasco, with voltages: 350 each side of C.T., 2.5 volt 12 amp. filament winding, 5 volt C.T. filament winding, special 3.75
Filament transformers, Arasco, with following voltages:
2.5 volt, 20 amp. \$3.74 11 volt, 6.5 amp. \$3.60
2.5 volt, 10 amp. 2.25 12 volt, 3.5 amp. 3.60
5 volt, 10 amp. 3.25 14 volt, 3.25 amp. 3.75
7.5 volt, 7 amp. 2.50 15 volt, 3 amp. 4.25
10 volt, 6.5 amp. 3.75
New DeForest 231 tubes, all guaranteed 1 year. 1.50
New DeForest 222 tubes, all guaranteed 1 year. .90
Relays, Arasco unmounted, 1000 uses, will follow 40 WPM, double one-eighth inch contacts. 1.39
Genuine new Pilot Universal all-wave Super-Wasp, A.C. complete in cabinet, list \$95, special 32.50
Complete Presto semi-commercial home recorder, in portable case. Cutting-head, microphone, pick-up, adaptors, 227 tube, motor, list \$150, net 43.50
Pilot D.C. Super-Wasp, slightly used 22.00
Pilot A.C. Super-Wasp with power pack, slightly used 34.50
New Samson Pam 19-20 Amplifiers 46.50
New Samson Pam 16-17 Amplifiers 35.00
New Receptor amplifiers \$8.95 to 15.00
Latest Models, Universal Microphones
Model X—\$5.65 Model BB—\$14.00 Model KK—\$27.00
Model LL—\$37.50

Teleplex with 3 rolls of tape \$13.00
UX 4 prong sub-panel sockets, dozen .25
General RCA UX 240 Hi-Mu tubes — 3 for 2.00
General Electric Complete Phonograph turntable 7.50
National coils for SW-3 or 5 up to 2,000 meters—Special, UX or UY isolantite low loss socket, each .30
Electric soldering irons, \$79. Hvy. duty 1.65
Thordarson new 1500-2000 volts each side of center-tap, 500 watt. \$16.85, 1,000 watt 22.75
Thordarson double button mike transformer 4.00
GE Tungar new trickle chargers with tube 6.00
Enamel No. 40 magnet wire — special \$70 lb. Other sizes .65
Genuine RCA UV 872 mercury vapor tubes 12.00
Carter 5 Pole double channel Panel inductance switch 1.20
Eby binding posts, assorted, dozen .50
RCA lic. tubes, UV 227, 226, 224, 245, 201A, 247, 235, 280, Also Sparton tubes .39
Best grade No. 12 enam. aerial wire, per 100 ft. .65
200 ft. roll 1.25
Stromberg-Carlson 2 Henry 300 mil. key click chokes 1.25

ARSCO TRANSMITTING CONDENSERS
1 YEAR UNCONDITIONALLY GUARANTEED
1,500 volt 2,000 volt 3,000 volt 3,500 volt
1 mfd. \$1.95 1 mfd. \$4.50 1 mfd. \$8.50 1 mfd. \$9.50
2 mfd. 3.50 2 mfd. 6.50 2 mfd. 12.50 2 mfd. 14.00
4 mfd. 5.25 4 mfd. 12.50 4 mfd. 22.00 4 mfd. 26.00
Very sturdily built, finest material. All cont. working d.c. voltage.

600 volt 800 volt 1,000 volt
1 mfd. .20 1 mfd. .30 1 mfd. .50
2 mfd. .25 2 mfd. .40 2 mfd. .70
3.5 mfd. .35 3.5 mfd. .50 3.5 mfd. .90
4 mfd. .40 4.5 mfd. .60 4 mfd. 1.00
The new National SW3 d.c. or a.c.
The new National SW5 d.c. or a.c.
National power pack and all other National products in stock.

Write for Lowest Prices in the Country!
One-half watt neon tubes, \$4.45—1 watt. \$.55—2 watt. 4.00
RCA UX 210, new original cartons 3.40
RCA UX 250, new original cartons 3.40
Mercury vapor 280M tubes 1.45
G.E. 5 watt 1162 Navy tubes, three for 1.00
250 watt Clarostat primary rheostat, all ranges 3.50
W.E. 211D gear oscillator, used, \$10. New 15.00
W.E. 212D guaranteed, used, \$35. New 50.00
Slightly used 860 22.00
Aerovox .00005 to .00025 5000 volt condensers .75
Aerovox .0005 to .0015 5000 volt condensers .90
Aerovox .002 5000 volt condensers 1.00
Monitor cans 5x6x7 cover drilled, ready to go 1.20
Jewell 107 tube checker 6.25
Radio Amateur Call Books .80
Arasco 10,000 ohm 100 watt trans. grid leaks .69
Arasco 12,500 ohm 100 watt trans. grid leaks .69
Ward-Leonard 25,000 ohm trans. grid leaks, 100 watt .95
OHMITE 5000 ohm 100 watt trans. grid leaks .55
National special variable cond. for dynatron oscillators 2.70
UX 222, UX 210, UX 250, special guarantee .95
Silver-Marshall or Pilot coil forms .39
Arasco calibrated monitors with three coils and individually calibrated charts, with tube 9.35
Arasco calibrated wavemeters 6.25
Arasco r.f. transmitter chokes .50
Arasco 50 watt sockets .95

Heavy duty MV, 866 tubes, guar. 1st quality. \$2.50
Extra heavy duty MV, 866 tubes, our own Arasco Brand, 1,000 hrs. unconditionally guaranteed 3.35

Weston Pattern 301, 0-50 milliammeters \$4.00
New Weston Pat. 476, 0-150 volts, AC meters, Net 5.00
ARBORPHONE AC Amplifier, 2 units, including power pack, uses one 227 ahead of two 171As, push-pull, beautiful job. Ideal for speech amplifier. Per pair 5.00
RECTOBULBS — new type R3 \$6.95. R81 3.50
New Ninth Edition — Yellow Cover — **AMATEUR HANDBOOK** — Hot off the Press \$1.00

STABILIZING RESISTORS OR BLEEDERS
Output Voltage Resistance Current m.a. Price
500 25,000 15 \$.85
1000 50,000 15 1.70
1500 75,000 15 2.55
2000 100,000 15 3.40

INCLUDE POSTAGE WITH ALL ORDERS AND 20% DEPOSIT AGAINST C.O.D. SHIPMENTS

Visit Uncle Dave's New Radio Shack When in Town. Good Time Assured, hit Four Story Building with over 35,000 square feet of space, devoted to nothing but parts. For Goodness' sake, what do you need? We sure got "it." — What have you for sale or trade? Wanted: Used Teleplexes and Omnigraphs.

Write for FREE HAM Sheet

WE CARRY EVERYTHING FOR THE HAM IN STOCK

Write for Free Ham Sheet

MORE FOREIGN TRADE SOLICITED

UNCLE DAVE'S RADIO SHACK

356 Broadway

Long Distance Phone 4-5746

ALBANY, NEW YORK

Cunningham

RADIO TUBES

RADIO'S MOTIVE POWER SINCE 1915



Good News for Amateurs

Cunningham prices
lowest in their history

At the present low prices Cunningham Radio Tubes embody the same high quality that has meant leadership on thru the years.

E. T. CUNNINGHAM, INC.

(A subsidiary of Radio Corporation of America)

New York / Chicago / San Francisco
Dallas / Atlanta

The J's

Box J, Mukilteo, Wash.

Editor, QST:

For the past months that I have been reading QST, there have been several occasions where reference is made towards my father's forefathers as the J — well, it would be a disgrace to have it printed again. We all know that it is the duty of each and every amateur to foster, create, and preserve our amateur spirit of international goodwill, and one way of diminishing that goodwill standard is to call the Japanese by that improper and disdainful prefix.

No doubt all of us are not aware that that abbreviation is considered an insult, which goes a long ways towards depreciating any international kindly feeling. What sa, gang? Let's uphold our spirit of international goodwill, and if the word Japanese is too long, let's say the J's.

— David Tanabe, W7BID

(QST is sorry, meant no disparagement, did not know that the term was disliked by Japanese, will not again use it. — Editor.)

Radio Friendships

128 East Cliveden Ave.,
Mt. Airy, Philadelphia, Pa.

Editor, QST:

Being an amateur since 1915, and this being my first letter to headquarters, I think you will agree that I'm not forward in recounting the following experience.

My log shows that on December 11, 1930, first contact was made on 'phone with WSAYG at East Stroudsburg. I had called CQ and, as WSAYG has since told me, he was going to find out where this fellow who signs "On the site of the Battle of Germantown" was located. We QSO'd — he found out. The log shows that the QSO's were repeated with increasing regularity, until on last 4th of July I decided to find out where this fellow who signs "The Voice of the Poconos" really hailed from.

I rolled the Chevy out, pointed it toward WSAYG and stepped on the gas. I found him, a fine fellow, in the midst of the old pastime, rebuilding. We had a fine visit and additional ones were arranged which culminated in one December 10th, 11th, 12th.

On the anniversary of our first QSO, December 11th, WSAYG and I forgot radio and left for a deer camp in the heart of the Poconos. Bright and early the next morning the radio gunners got in action and before noon the net result was two deer; WSAYG bringing down a nice buck with a beautiful 175-yard shot. Needless to say, the trip was highly successful and a fitting celebration on the anniversary of our first QSO.

The point I wish to bring out is that the contact with WSAYG on the morning of December 11, 1930, was not merely "another QSO" but another friendship made. Another example of what amateur radio really is.

— W. LeRoy Anspach, W3BD



KNOW YOUR CONDENSERS

CONFIDENCE, born of knowledge obtained through many exhaustive tests in actual service, has enabled engineers and designers in the most famous shops and laboratories, Army and Navy technicians and noted physicists to unhesitatingly choose and specify CARDWELL condensers for developments requiring variable condensers of unquestioned efficiency and reliability.

In addition, conclusions reached after tests and measurements not possible to the average user of condensers, further influence the use of the good CARDWELL by these most expert of experts. They can't afford to be wrong.

That is why CARDWELL condensers are known the world over as the "Standard of Comparison."

The CARDWELL Featherweight Midway, the *big* little condenser, pioneer in its class and now famous on the Airways, is made in 13 stock sizes and special to order, for both receiving and transmitting. It has many applications now being served, in many cases, by inadequate and inferior makeshifts. Get acquainted with the Midway, as different from the usual "quantity production" small-size condenser as a fine time-piece is different from a dollar watch. The largest, Type 413-B, is a 150 mmfd., 3000 volt transmitting condenser and weighs but *seven ounces*.

Like *all* CARDWELL condensers the CARDWELL Midway is precision built, vibration proof, sturdy and strong. Reliability and strength have not been sacrificed to any expedient making for cheapness of manufacture. Skilled artisans, not rivet presses, assemble them.

There are many other CARDWELLS, in infinite variety, for receiving and transmitting, ranging from the fine little "Balancet" to giant condensers for commercial transmitting and broadcasting.

It will pay you to know about CARDWELLS — ask the Hams.

Send for literature

CARDWELL CONDENSERS

The ALLEN D. CARDWELL MFG. CORP.

83 Prospect Street, Brooklyn, N. Y.



The supplier who tries to discourage you, or attempts to substitute, or refuses to supply CARDWELLS has not *your* interest at heart. He can get CARDWELLS for you if *service* means as much to him as a little more *profit*. Get what you want—insist on *CARDWELLS*. Order direct from us if your dealer will not supply, or let us tell you where you may buy.



"THE STANDARD OF COMPARISON"

A THOUSAND RANGES from this HANDY KIT!



The unbroken seal certifies quality.

This new Certified Kit contains 20 I.R.C. Metallized Resistors of the most-used sizes — 500 ohms to 3 megohms. It is

FACTORY-SEALED, FACTORY-TESTED, and FACTORY-GUARANTEED

It gives any value you want. A thousand ranges — two thousand — or more are possible from this little kit. Free information with every kit tells you how.

With the kit, you get our I.R.C. Resistor Replacement Guide free — also our R.M.A. standard Color Code Chart. See your jobber today.

International Resistance Company
Philadelphia Toronto

IRC

Metallized
and

**PRECISION WIRE WOUND
RESISTORS**

INTERNATIONAL RESISTANCE CO.
2006 Chestnut Street, Phila.

Gentlemen:

I enclose () check () money order for \$3.50 — for which please see that I receive Certified Kit of Metallized Resistors—also Resistor Guide and Color Code Chart, free.

Name.....

Address.....

City.....State.....

Q-3

I. A. R. U. News

(Continued from page 62)

Vern S. Gouker, W9DHM; O. M. Carter, W9ADN; Clifton Brown, VE3BM; J. Adama, PA0FB; W. E. Bachman, W6BIP; S. Hokodate, J1DR; Eugene Philip Rhoades Eckenbrack, Jr., W7VY; Sidney R. Perkins, ZL2GK; A. W. Alliston, G5LA; E. Kerker, PA0XF; R. Ohrbom, VK3OC; Werner H. T. Olpe, W2BUO; G. I. Nakayama, K6ERH; Neil Werner, W9AJA; Vaughan E. Marshall, VK3UK; Hans Woletz, OK2OP; Fritz Woletz, OK2RM; J. Deutekom, PA0DJ; Palmer Andersen, W9DOQ; W. B. Sydenham, G5SY; Pat Carr, W7LK; A. L. McIntosh, W6CYR; Carlton D. Tobin, W2CQX; Albert H. Dabb, W2CAY; Syd. G. Taylor, ZL2GW; A. W. Borgia, W6EOU; Sam Powers, Jr., W1AVL; A. Brown, G2WQ; Roy E. Abbott, VK2YK; Herbert Petzoldt, D4MFM; G. Leclercq, ON4GN; Arpad Cargay, HAF3D; Erwin Krebs, HAF3D; H. Chapman, VK3GU; Philip H. Bloom, W8DV; Burton S. Waldron, W9AKN; Vincent S. Roddy, W8DJV; W. H. Crammond, VK2KJ; Norman C. Ballbach, W8SY; Marshall S. Killen, CT2AA; Lionel T. Swain, VK2CS; Burton T. Simpson, M.D., W8CPC; J. B. Kershaw, G2WV; J. B. Kilpatrick, W6DIO; Max B. Buck, W2AMA; Dr. George A. Mack, Jr., W2BYP; C. R. Spicer, OM2CS; Maanobu Tada, J1DP; K. Nakamura, J1EC; Shizo Sugita, J1DN; Y. T. Yagi, J1DO; Allan W. Gordon, W1ACI; Rene Frere, F8EJ; Abraham Persson, SM3XJ; J. T. H. Chiang, AC2AY; S. Handa, J1DM; Ezequiel Santos, CM2WA; W. G. Manson, VQ3MSN; John L. Green, VE4BG; G. O. Milne, W2ZA; Orlo Palmer, W8BV; J. Littlewood, G5LW; L. R. Stroud, ZLAAP; James C. Lewis, W9DKU; Jesus M. de Córdoba, EA996; Robert Keir, ZS8Y; Walter Gilbert Ashbridge, ZL2GP; Douglas H. Borden, W1BUX; John R. Schultz, KA1JR; William H. Leavitt, K6BOE; Ralph H. Baer, W9BQH; Paményi Pál, HAF6B; Rene Gerr. F8TEX; William Jan Alblas, PA0KW; Zygmant C. Bresinski, SP1KX; Eugene Kern, W2BAK; Jager de la Fuente, EA18; Dr. George L. Deichmann, Jr., W3HG; T. P. Allen, G16YW; Bill Williams, W6AHP; W. J. Hamburg, W8BOS; G. B. Ragless, VK5GR; Sidney Edwards, ZL1BT; Carl Herbart, W8CU; Frank Greben, W9CES; Abilio Nunes dos Santos, Jr., CT1AA; Adriano Lopes Viera, CT1CW; Pierre Niquet, F8UG; Ormsby P. Taylor, W6BAX; M. W. Maey, W9UM; Wallie Gee, W6EGH; Marcel Verhelst, ON4XB; Y. Van Hool, ON4FE; Stanley Higson, G2RV; Stanley Beach, W8APM; S. Fabin hijo, CX2BT; Carlos Cordovez, HC1FG; Arch. G. Meyer, W6EEP; K. Nakagawa, J1EE; W. H. Wilson, W1QB; Nobutaka Tanaka, J3DI; R. Ciseau, F8GQ; Marcelino Rey, LU1CA; John Kelliher, W6AHZ; Jar. Pavlicek, OK2CC; Courtney Mathews, W6EAK; John Pakola, W6EDT; G. Auger, F8OD; Fritz Haas, G01FH; Julius Kron, D4SAR; A. J. A. Schoevers, PK2AJ; Edward C. Crossett, W1CCZ; H. T. Miller, W2AIS; Leslie Rosenblatt, W6QW; Erich Kohout, U0CX; G. Cordier, ON4JF; Baron Bonnet de la Roche, ON4HM; Ralph R. Heiges, W6EXQ; David S. Snyder, W6ZS; B. G. van Gemert, PA0GG; Bedrich Mayer, OK1NA; Sydney C. Parish, G2ZW; Harry C. D. Hornsby, G5QY; James N. Smith, W6DOZ; Milo Lacy, W6DJP; Emilio Rotellar, EA937; A. von Wattenwyl, HB9Y; J. Davies, G2OA; Harold E. Jordan, W2VO; Jean A. Lips, HB9J; George Fink, W6DIP; L. van Amedey van Duyn, PA0LD; Dan G. Bardin, W6BSJ; Jacques Mahieu, ON4AU

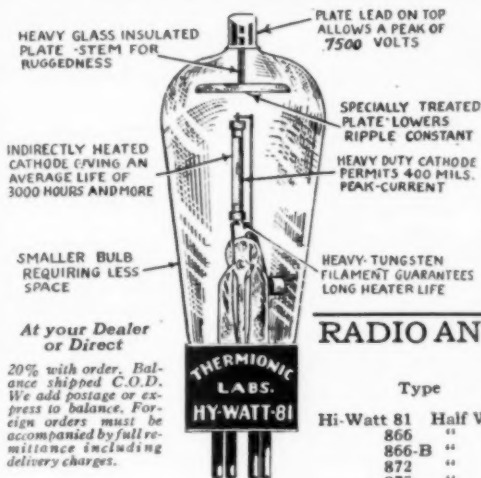
Communication Department

(Continued from page 60)

W4ZV 11, W4AGB 10, W4PI 10, W4AER 8, W4ASR 7, W4HY 6, W4MF 5, W4AKH 5, W4GM 5, W4DE 21, W4AIJ 2.

WESTERN FLORIDA — SCM, Eddie Collins, W4MS-W4ZZP, Route Manager W4ACB-W4PCN. W4FV-W4ZZR just returned from a visit up north and found his "J" card waiting for him. W8BGX from Ohio is with us for a while. W4QR-W4AQG has declared a hi-power holiday. W4AAX has given up ham radio. W4SC still holds up its FB record. W4AUA is about to get on the air. W4ML is a new call that has been issued to one of the ops at W4AFT. W4AFT is still pounding out FB. W4AGS-W4PCK sends in a very FB report. W4KB has an excellent crystal-controlled 'phone. W4AQY has received 100% QSL's on QSOs to date. W4AOO is still very quiet. W4AXP is getting out FB. W4AUW and W4AUV have been extra busy getting things ready for the hamfest to be held in

... For a RELIABLE and CONSTANT D.C. Supply



At your Dealer
or Direct

20% with order. Balance shipped C.O.D. We add postage or express to balance. Foreign orders must be accompanied by full remittance including delivery charges.

Replace your HY-Vacuum 81's

WITH

THERMOTRON HY-WATT '81's

Mercury Vapor Rectifiers

... They last longer

RADIO AND INDUSTRIAL RECTIFIERS

Type	Filament Voltage	Filament Current	Maximum Inverse Peak Voltage	Anode Peak Current	Net Price
Hi-Watt 81 Half Wave	7.5	1.25	7500	0.4 amps.	\$5.00
866 " "	2.5	5.0	7500	0.6 " "	5.00
866-B " "	5.0	5.0	7500	1.2 " "	10.00
872 " "	5.0	10.0	7500	2.5 " "	14.00
875 " "	5.0	10.0	15000	2.5 " "	24.00
869 " "	5.0	20.0	20000	5.0 " "	150.00

"INHERENT QUALITY CANNOT BE DENIED"

THERMIONIC LABORATORIES

10 LIBERTY ST.

KEARNY, N. J.

U. S. A.

CAN? YOU?

If you can't do all this in the column to the right you should take THE CANDLER SYSTEM Course in High-Speed Telegraphing. It trains your Brain, Muscles and Nerves to CO-ORDINATE in doing fast, accurate work. It gives you CONFIDENCE, natural CONCENTRATION and banishes Nerve Strain. Original CANDLER METHODS have developed over 45,000 of world's fastest Morse and Radio operators including the champion.

TELEGRAPH-TOUCH-TYPEWRITING—only method for operators. Shows how to use "mill" in receiving, how to copy several words behind easily at high speed.

FREE Advice. If you want to become a real EXPERT Radio Operator, write Candler and receive the benefit of his 20 years' experience in developing EXPERTS. Your questions will be answered promptly and personally.

What Amateur
and Commercial
Radio Operators
Can Do With the
Help of the

CANDLER SYSTEM

They can make perfect copies of WNU press with pencil or "mill"; can cut mimeograph stencils directly from WNU, WHD and KUP press; can copy press 3 to 5 words behind easily without losing out; can count checks automatically and OK copy instantly; can send perfect code groups with key or bug at 30 to 35 wpm and more.

WALTER H.
CANDLER
World's Only
Code Specialist,
Instructs
You Personally



Candler System Co., Dept. Q3
6343 South Kedzie Ave. Chicago, Illinois

QST Oscillating Crystals

"Superior by Comparison"

New Price List Effective Immediately

New prices for grinding power crystals in the various frequency bands, said crystals ground to an accuracy of plus or minus .03% mounted:—

(Frequency range)	New list
100 to 1500 Kc.	\$40.00
1501 to 3000 Kc.	\$45.00
3001 to 4000 Kc.	\$50.00
4001 to 6000 Kc.	\$60.00

Above prices include holder of our Standard design. If crystal is wanted unmounted deduct \$5.00 from the above prices. Deliveries can be made within two days after receipt of order. In ordering please specify type tube, plate voltage and operating temperature. Special prices will be quoted in quantities of ten or more.

POWER CRYSTALS FOR AMATEUR USE

The prices below are for grinding a crystal to a frequency selected by us unmounted (if wanted mounted add \$5.00 to the price list) with a calibration accurate to BETTER than a tenth of one per cent. Immediate shipments can be made and all crystals guaranteed.

1715 to 2000 Kc. band	\$12.00 each
3500 to 4000 Kc. band	\$15.00 each

LOW FREQUENCY STANDARD CRYSTALS

We have stock available for crystals as low as 13 Kc. Prices upon receipt of specifications.

SCIENTIFIC RADIO SERVICE

124 Jackson Ave., University Park
HYATTSVILLE, MD.

"Crystal specialists since 1925"

Say You Saw It in QST — It Identifies You and Helps QST



A.R.R.L. FORMS FOR THE AMATEUR

THE AMERICAN RADIO RELAY LEAGUE

MEMBER'S CORRESPONDENCE

MEMBER'S CORRESPONDENCE STATIONERY

One color (black) heading now being used at greatly reduced cost to members.

Write your radio letters on League stationery — it identifies you.

Lithographed on 8½ x 11 heavy bond paper.

100 sheets.....50c
250 sheets.....\$1.00
500 sheets.....\$1.75

Postage Included

THE AMERICAN RADIO RELAY LEAGUE HEADQUARTERS WEST HARTFORD CONN. U.S.A.		RADIOGRAM	
CITY OF ORIGIN HARTFORD, CONN.	STATION OF ORIGIN W4ACB	NUMBER 304	DATE MAY 24 '45
TO CARL PHILIP PERIS 14 WEST STREET N.E. ROCKFORD ILL.		THIS MESSAGE WAS RECEIVED AT STATION NAME STREET ADDRESS CITY AND STATE	
KINDLY ADVISE PRESENT STATUS OF THE ORIGINAL TRAFFIC ROUTE DURING FROM THE EAST COAST TO THE GIBBY STOP IS W4ACB STILL A MEMBER OF THIS CHAIN YOUR LATEST ROUTE W4ACB'S BULLETIN MAILED TODAY TO R. L. GATLEY			
Rec'd	FROM STATION	LOCATED AT	DATE
Sent	STATION	ENDPOINTS, DISTRIBUTION, PA.	5/24/45 8:34 P.M. HP

OFFICIAL A.R.R.L. MESSAGE BLANKS

Most convenient form. Designed by the Communications Department of the A.R.R.L. Well printed on good bond paper. Size 8½ x 7¼. Put up in pads of 100 sheets. One pad postpaid for 35c or three pads for \$1.00.

MESSAGE DELIVERY CARD RADIOGRAM VIA AMERICAN RADIO RELAY LEAGUE	
From:	Date:
To:	
Time received:	Date:
Address:	At Radio Station:
THIS MESSAGE WAS TRANSMITTED FREE OF CHARGE BY AMATEUR RADIO STATIONS OF THE AMERICAN RADIO RELAY LEAGUE RECEIVER WILL BE SENT FREE OF CHARGE AT THIS STATION	

MESSAGE DELIVERY CARDS

Neatest, simplest way to deliver a message to a near-by town. On U. S. stamped postals 2c each. On plain cards (for Canada, etc.) 1c each, postpaid.

AMERICAN RADIO RELAY LEAGUE
WEST HARTFORD, CONN., U.S.A.

Marianna. W4ASG is trying to get a 'phone ready for the hamfest. W4UW-W4NO says that his 50 doesn't perk so hot. W4ART is still pounding his low-powered outfit. W4ARV has been showing him how to QSO DX. W4ATN has been trying a new transmitter. W4QK has returned to the air at his new QRA. W4QU is experimenting with AC receivers. W4UW has had a QSO with a ZL. W4MX has given up the "YL" at last. W4ALJ-W4CV is in the same boat. W4ASV can QSO nothing but W1 and W2 stations. Hi. W4AXF has her 'phone perking again. W4SZ and W4OE have not been heard from. W4VR is intending to get on the air. W. R. Miller and Ned Rowland have been trying to get on the air. W4MS-W4ZZP is putting a crystal rig on 3560 kc. W4AUW and W4AQY are our latest ORS. Congrats, OMs.

Traffic: W4AGS 49, W4KB 32, W4FV 27, W4MS 23, W4UW 12, W4ACB 5, W4QR 3, W4QU 4, W4AQY 2, W4AXP 2, W4ARV 1, W4ART 1, W4ASV 4.

GEORGIA-SOUTH CAROLINA-CUBA-ISLE OF PINES-PORTO RICO-VIRGIN ISLANDS — SCM, J. C. Hagler, Jr., W4SS — K4RK sends in a new way letter with the information that E. W. Mayer, ex-K4KD, is back in P. R. K4PCI has returned from N. Y. W4SM leads the traffic list with K4RK and CM8YB trailing him. CM8AZ has schedules with W4OT and W4EP. W4AAY gets quick action when he orders parts via radio. W4GH is working 'phone. W4HN is on the air at his new QRA, Charleston. S. C. W4AZT and W4NE are new hams in Spartanburg. S. C. CM2JM is back on the air. W4BBR is an addition to the ranks at Smyrna, Ga. While home on vacation W4ADA worked UN5FA. W4WB made a visit to W4SM's shack. We are glad to hear that W4BAL is well again. W4BBV and W4BBQ are new hams in Cedartown, Ga. W4UC has a card from India. W4LL is working hard on a 'phone rig. W4DV has a new 7-mc. outfit remote controlled to a new shack in his back yard. W4BAR is a new ham on 'phone in Augusta. An Amateur Radio Club has been organized in Augusta with W4AAY President, W4SS Vice-President. W4GT Secretary and W4AZS Treasurer. Meetings are held on the first and third Wednesdays of each month. Visitors will be most welcome. CM8YB's report just got under the wire.

Traffic: W4SM 301, K4RK 181, CM8AZ 73, W4AAY 53, W4AFQ 52, W4PM 50, W4SS 30, CM2JM 13, W4BBR 20, W4MA 19, W4ADA 7, W4AJH 12, W4WB 5, W4BW 4, W4AOX 4, W4DV 20, CM8YB 112.

WEST GULF DIVISION

NEW MEXICO — SCM, Jerry Quinn, W5AUW —

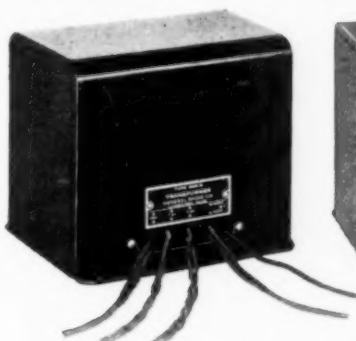
W5BUY is active again. W5BQE has rebuilt his transmitter. W5BRV is very active on the A.A.R.L. net. W5AOH sends in his first report. W5ZM has his old '10 going again. W5ND will get bit again soon. W5AOD is our only ORS. W5ASR is on with a 211 and an '04 in MOPA. W5AUW has a 211 and a '49. W5AOE is still working DX.

Traffic: W5AOD 483, W5AUW 130, W5AOE 17, W5ZM 15, W5BRV 5, W5AOH 4, W5BQE 4.

SOUTHERN TEXAS — SCM, H. C. Sherrod, Jr., W5ZG — Houston: W5TD has moved to 1510 Ridgewood Street, Houston. W5ANW is using his 'phone on 3517 and 3538 kc. W5BKW has a new 150-watt PP TPTG rig. W5LB keeps this rig hot. W5BHO now boasts three transmitters. W5EI is second operator at W5BHO. W5ADZ is getting out well with a '45. In the past month W5ADZ has been QSO with Australia twice. San Antonio: W5UX is thinking of moving to 3.5 mc. W5MN is resuming his schedules. W5BWM sends in a nice report. W5CD shut down to increase power and percentage of modulation. W5BKI has worked quite a few Aussies and Zedders. W5CAS gets more in a hertz with a couple of '10s than many can get with much greater power. W5BQH has a portable call, W5SD. W5ALN is a newcomer at Sequin. W5AUC, Smith and Muller, are on again after moving station. Lt. Pirtle is building a 100-watt push-pull rig at Randolph Field. W5CBC is trying to get W5AUC to erect a 14-mc. antenna. Corpus Christi: For the following I am indebted to W5BKG. W5ZN is on the air with a pair of '45s in push-pull. W5AB is home from the S.S. Swiftlight on an eighteen-day leave. W5ATU is building a high-frequency receiver. W5AQK and W5ATU have combined forces. The code class sponsored by the Corpus Christi Radio Club is making excellent progress. Santa Claus brought W5ALV a brand-new 1932 Chevrolet. W5TO had a big celebration New Year's. W5MS is doing A.A.R.L. work every Monday night. Nelson has a second op., whose call is W5AR. Incidentally, W5AR is a she.

POWER SUPPLY FOR AMATEUR TRANSMITTERS

TYPE 565-B
Full-Wave
Power
Transformer
\$13.50



TYPE 527-A
Rectifier
Filter
\$17.50



● This transformer and filter with two 281-type rectifier tubes and their sockets make a complete filament and plate-power supply for two 210-type tubes. Here is an excellent combination for phone work. ● When ordering remember that we ship within 24 hours after receiving your order, and if cash accompanies it, we prepay the postage to any point in the United States or Canada.

GENERAL RADIO COMPANY CAMBRIDGE A, MASSACHUSETTS

Pacific Coast Warehouse: 274 Brannan Street, San Francisco

BOUND VOLUME XV of QST

WE have a limited number of copies of Bound Volume XV of *QST*. Vol. XV comprises the entire 1931 series of *QST*. This volume is made up of two books or sections, each containing six issues of *QST*. It is handsomely bound in red cloth and with gold imprint.

The complete volume is priced at \$5.00, postpaid.

QST

38 LaSalle Road
West Hartford, Connecticut

It's free: the story of Centralab FIXED RESISTORS

Thousands of copies have already been distributed to servicemen, amateurs and engineers. Get your copy now . . . and this well-illustrated, informative booklet is free for the asking. Use the coupon . . . today.

Note: Effective Jan. 1st, 1932. New low price on Centralab Volume Controls now make these Replacement Units more popular than ever.

Centralab

MAIL COUPON TO-DAY

CENTRAL RADIO LAB.
929E Keefe Avenue, Milwaukee, Wisconsin

Please send me your free booklet describing
CENTRALAB FIXED RESISTORS

Name.....

Address.....

City.....State.....

QST

Jewell Radio Company

**POWER AMPLIFIERS
PACKS SUPPLIES A SPECIALTY**

Exclusive Eastern Distributors for

PURADYNE PRODUCTS

Reg. U. S. Pat. Office

The PURADYNE Plate supply transformers have been designed so that they may be adapted to the most common applications in rectifying and transmitting circuits. The primary windings are designed for operation from a 60 cycle 110-115-volt supply. All units are designed for continuous operation at full load. The insulation test at a potential of 10,000 volts insures satisfactory operation under all possible conditions.

No.	Out Put Voltage	Filament Voltages	Watts	Price
80	2500-0-2500		850	\$13.00
	1500-0-1500			
50	1500-0-1500		500	9.00
	1000-0-1000			
10	750-0-750	7 1/2 V. c.t.-7 1/2 V. c.t.	325	5.00
10A	600-0-600	7 1/2 V. c.t.-7 1/2 V. c.t.		4.00
45	375-0-375	2 1/2 V. c.t.-2 1/2 V. c.t. 5V.	100	3.50

Shielded with stand-off insulators
No. 80 \$15.00 No. 10 \$6.00
No. 50 10.50 No. 10A 5.00

PURADYNE filament transformers, 10,000V. insulation in metal cases with stand-off insulators. All guaranteed for one year against any defects.

ALL CENTER TAPPED:

2 1/2 V. — 12 amps for 866's	\$3.50
2-2 1/2 V. c.t., 10 amps each winding	4.50
5V. — 20 amps, for 872's	6.00
7 1/2 V. — 7 amps, for 210s, 250s, 281s	3.50
2-7 1/2 V. c.t. at 6 amps, each	4.50
3-7 1/2 V. c.t. at 6 amps, each	6.50
10V. — 7 1/2 amps for 203As, 211s, 852s, 860s, 845s	4.00
12V. — 10 amps for 204As, 212Ds	4.50
14V. — 12 amps	5.50

PURADYNE microphone transformers in neat shielded cases, single button, \$1.75 — double button, \$3.50. Mike stands, table model, \$2.00, floor model adjustable to eighty inches, statuary bronze or silver finish, \$4.50.

PURADYNE 250 Mil choke 30 Henrys 110 ohms d.c. resistance in metal case with stand-off insulators, \$3.00.

PURADYNE 500 mil choke, same as the above, \$7.50.

PURADYNE 30 Henry 125-mil choke 260 ohms d.c. resistance, \$1.00.

PURADYNE 30 Henry 250 mil double chokes, \$5.00.

PURADYNE .001, .002, .006 plate-blocking condensers with stand-off insulators, \$.75.

PURADYNE guaranteed transmitting filter condensers, metal cased with stand-off insulators. All condensers rated at a continuous working voltage.

Capacity	1000 Volts	1500 Volts	2000 Volts	3000 Volts
1 mfd.	\$1.25	\$2.00	\$3.00	\$6.00
2 mfd.	2.00	3.00	5.00	12.00
3 mfd.	2.50	3.50	6.50	28.00
4 mfd.	3.25	5.50	9.00	36.00

PURADYNE 200-watt center-tapped transmitting grid-leaks in metal case with stand-off insulators:

5,000	\$1.75	20,000	\$2.50
10,000	2.00	30,000	2.75
15,000	2.25	50,000	3.75

NOTE: JEWELL carries the most complete line of power amplifiers and PA Systems in the city. Send for literature.

PURADYNE heavy duty 50 watt sockets, porcelain base, metal shell, double contacts, Very special, \$1.00.

PURADYNE 281 Mercury Vapor Rectifying Tubes, \$4.00.

PURADYNE Mercury Vapor AAA heavy duty 866 Rectifying Tubes, \$4.50.

R.C.A. Sockets model UP 542, \$.45.

PURADYNE 175 K.C. superheterodyne intermediates in neat aluminum case, shielded, \$.95.

Special Class B Modulation Transformers, a pair, \$35.50.

PURADYNE COPPER COILS, \$1.00 each, per turn

Inside Dia.	3/16"	1/2"	5/8"	3/4"
2 1/2"	8c	9c	11c	14c
3 1/4"	9c	11c	14c	
4 1/4"	7c	8c		

Fibre Tubing 1/4 inch and 1 inch, per inch, \$.93.

LAST MINUTE SPECIALS

THORDARSON Fil. Transformer 1 1/2 V. 2 1/2 V. 5V. \$1.25

JEWELL 0-25, 0-50, 0-100, 0-300 mils. Type 135, 2.50

Single button receiving and transmitting microphones 3.50

R.C.A. 2 Henry 300 mils, 20-ohm key click and filter chokes 1.25

Mercury Vapor 866 Tubes, Guaranteed, 2.95

Enamelled aerial wire No. 10, 100 feet solid, .90

Pigtail resistors, all sizes \$1.10 each, dozen, .85

Puradine Bee Hive Insulators, \$1.10 each, dozen, .75

We Can Supply Anything — At Jewell's Prices — Ask For It

Compare the Prices

Include postage with all orders and 20% deposit

against C.O.D. Shipments

Jewell Radio Company

58 Vesey St., Dept. S., New York City

Phone Barclay 7-5907

Rosenberg: W5AVV is a newcomer. Kerrville: W5BKZ is rebuilding for 1750-kc. 'phone. W5BSF has a card from Africa. W5BKE, Route Manager, is working with W5AUL of Abilene to organize a route to connect with Trunk Line "D." Austin: W5CT, Route Manager, is the sole representative for the Capitol City. Why not more reports from Austin? Bryan: W5AQY was only on the air one week of the past operating month. El Paso: W5ES has been elected official reporter for the El Paso Amateur Radio Club. W5AAU will be on shortly with a 3.5-mc. 'phone. W5AEC is using a 50-watter with crystal control. W5AEP is using a 50-watt MOPA. W5AFN is using an '04a crystal-controlled. W5AFS is using a 50-watter in ultra audio circuit. W5AOT is using a rig similar to W5AFS. W5AJS has been playing basketball and football on the Texas College of Mines teams. W5DE is President of the El Paso Radio Club. W5BL is suffering from QRM from KTSM. W5BNJ is using a '10 in ultra audio circuit. W5BNR is using a '10 in TPTG on 7 mc. W5BOD has a fifty on 7 mc. W5BQU is using two '10s in a hartley on 7000 kc. W5CAW uses push-pull '10s on 14 mc. W5CCW uses two '45 tubes in push-pull on 7 mc. W5FW, Hendricks and White, are using a '52 with remote control. W5NT is using a 25-watt portable rig. W5BDF will be on as soon as the antenna is erected. Let's get together, fellows, and have more and better reports for these columns.

Traffic: W5BKG 12, W5AUC 64, W5BWM 12, W5MN 123, W5UX 21, W5BHO 67, W5BRW 31, W5BNJ 7, W5BNR 34, W5BQU 23, W5FW 305, W5NT 37, W5AQY 26, W5CT 114, W5BKE 351.

OKLAHOMA — SCM, Wm. J. Gentry, W5GF — W5AEJ is going back to Stillwater. W5VQ is Oklahoma's new Route Manager. W5AND and W5AOW are new stations in Okla. City. W5BOE tells the SCM that the Ponca City gang threw a big party for the Tulsa boys. W5BBL is a new 'phone station in Okla. City. W5AKX says he should be an ORS. W5ATB is a new reporting station. W5AAQ changed his antenna system. W5BPM is sure sending in a nice traffic report. W5BMU got some nice traffic. W5WR reports that the Tulsa Radio Club has elected new officers. W5ALD is doing powerful good traffic work. W5BRD is back on the air in Shawnee. W5BWO is a new station in Shawnee. W5BHW has been busy with his school work. Let's hear from more of the gang in Okla. Report even if you do not have traffic. W5AAV is building a new receiver.

Traffic: W5VQ 1116, W5ALD 214, W5BMU 204, W5BPM 59, W5WR 23, W5AAQ 22, W5GF 14, W5BOE 13, W5ATB 11, W5AEJ 10, W5AKX 9, W5BBL 4.

NORTHERN TEXAS — SCM, Roy Lee Taylor, W5RJ

— W5WW makes the BPL with a real traffic total. Congrats, Adams. W5RH handled his share in fine style. W5AUL is traffic handling as usual and doing fine work as Route Manager. W5CF is picking up traffic in fine style. W5HY makes the BPL on deliveries! W5BII, Assistant Route Manager, has been very instrumental in getting new stations to report. W5AVF has a flock of schedules. He reports that W5NW-W5MZ is now back on the air. W5NW is a new ORS in our ranks. W5AAD wants an ORS. W5ARV reports a new monitor. W5AJG a new reporter from Dallas, is a traffic man. W5ASP, formerly of Wichita Falls, is now located in Dallas. W6BTU is the traffic man of Big Springs. W5AID has been working on his receiver. W5AXK reports everything OK his way. W5AWT reports he is still using 2.6 watts input. W5AZC has been overhauling the family lizzy. Hi. W5BNO is rebuilding his crystal rig. W5BXW reports that W5LY is working on new MOPA rig. W5BJX says that five members of the WFARC and three assorted YFs and YLs attended the Frederick, Okla., Club's banquet, January 12th. W5BIV has worked 910 miles in daylight with his type '12A tube. W5BYP of Wolfe City comes through with his first report. W5AL is still pounding away. W5AGH of Caddo Mills is handling plenty of traffic. W5ANE is doing well also. W5RZ is still bitten by the 56-mc. bug. W5BAM's ORS is cancelled, as is his OO, on account of inactivity. W5RJ is gradually getting the water-cooled job in shape. The Ft. Worth Radio Club will have the 250-watt crystal-control station of W5RJ at the Annual Southwestern Exposition and Fat Stock Show this year, and we need schedules for this stunt. The dates will be from March 5th to March 13th, and the call of W5DZ will no doubt be used. These reports are getting better all the time, it seems, and I want to thank you all for the wonderful cooperation you have shown. Several ORS have not renewed their ORS. This is very necessary and, unless they are returned at once for renewal, cancellations will be made.

CLASS "B" MODULATION

Complete amplifier and modulator—30 watt output—using 1-UX 238, 2-UX 245 and 2-UX 210 described in DELTA Bulletin No. 201

REQUIRES IMPROVED POWER SUPPLY

REGULATION

The Delta swinging choke automatically improves regulation.

SMOOTHING

The Delta filter chokes provide proper smoothing with low values of condenser.

Modern RAC power supply circuits and apparatus including the new transformers for M. O. P. A. systems are described in Bulletin 202.

SEND FOR COPIES

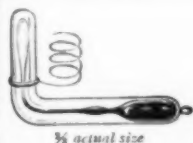
DELTA MANUFACTURING CO.

CHOKES AND TRANSFORMERS
37 OSBORNE ST.

KEY OR VOICE TO ANTENNA
CAMBRIDGE, MASS.

F. S. DELLENBAUGH JR.
PRES. & CHIEF ENGR.

G. E. M. BERTRAM
TREAS. & GEN. MGR.



MERCURY THERMOSTATS

For Quartz Crystal Ovens. 55° Centigrade or 131° Fahrenheit . . . **\$3.50**

New York Laboratory Supply Co.
206 Lafayette Street New York City

AMATEURS and EXPERIMENTERS!

Don't buy any radio parts until you have seen the



Write for your copy today

American Sales Company

44 WEST 18th STREET NEW YORK CITY

The Oldest "HAM" Supply House

Sending Is EASY

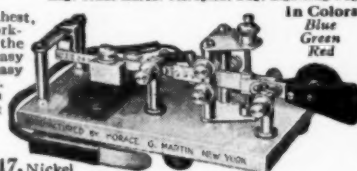
With the

Easy-Working
Genuine Martin No. 6

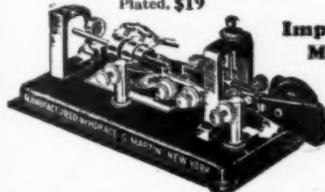
New VIBROPLEX

Reg. Trade Marks: Vibroplex; Bug; Lightning Bug

The smoothest, easiest-working bug on the market. Easy to learn. Easy to operate. Makes sending easy.



Black or Colored. \$17. Nickel Plated, \$19



Improved MARTIN Vibroplex

Black or Colored, \$17
Nickel-Plated, \$19

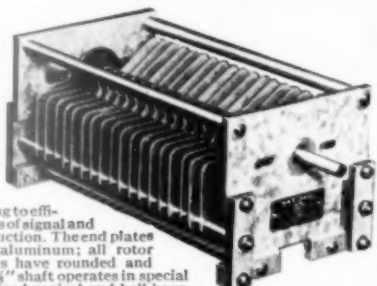
Special Martin Radio Bug — Extra large. Specially Constructed Contact Points for direct use without relay. Black or Colored. **\$25**

Old Vibroplex accepted as part payment
Remit by Money Order or Registered Mail

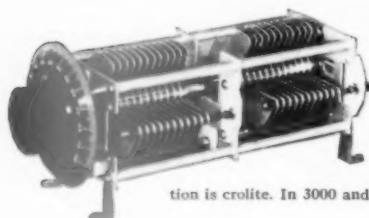
THE VIBROPLEX COMPANY, Inc.
825 Broadway, New York City
Cable Address: "VIBROPLEX" New York

TMU CONDENSERS

Designed especially to meet the demand for moderate priced stock transmitting condensers for higher power work than covered by our standard TM type. These condensers embody all the very latest features contributing to efficiency, steadiness of signal and rigidity of construction. The end plates are rugged cast aluminum; all rotor and stator plates have rounded and polished edges; $\frac{1}{4}$ " shaft operates in special accurately machined conical and ball bearings. Has special high current, low impedance, rotary brush type of rotor contactor. Micalex insulation is standard equipment in Type TMU Condensers.



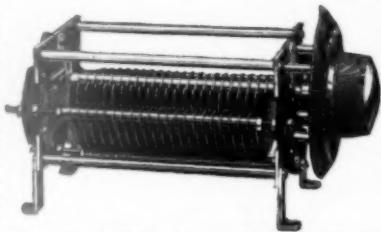
TMP PUSH-PULL CONDENSERS



Split Stator Type High Voltage Condenser, for use in Push-Pull circuits. Constructed in standard TM frame. Plates are of heavy gauge polished aluminum with well rounded edges. Insulation is croilite. In 3000 and 6000 volt ratings.

STANDARD TYPE TM CONDENSERS

The National Transmitting Condensers are widely used by the U.S. Government, broadcasting stations, communication companies and amateur transmitters, and are mechanically and electrically correct. The condensers are supplied with either $\frac{3}{16}$ " or $\frac{1}{4}$ " spacing for high voltage work. Standard insulation for all the TM type condensers is croilite.



NATIONAL TRANSMITTING CONDENSERS

NATIONAL COMPANY, INC.
61 Sherman Street
Malden, Mass.
Gentlemen:

Please send me your Bulletin No. 150 on NATIONAL Transmitting and Amateur equipment.

Name.....

Address.....

QST-3-32

And remember the certificate is one of Merit for traffic handling, and not merely for looks. Please see that all ORS report traffic next time, or the offending stations must expect cancellation. Let's get things going like real ORS should. We need some real Official Observers to handle the job properly; also Official Broadcast Stations. W. W. ADAMS OF W5WW WINS THE HANDBOOK FOR MAKING THE BPL. It was a tie as to the first to make the BPL between W5WW and W5HY, but W5WW won by handling the most messages. Congrats on this, WW. And don't forget the prize offered by the SCM for the greatest total.

Traffic: W5WW 511, W5RH 203, W5AUL 202, W5CF 182, W5HY 147, W5BII 65, W5AVF 61, W5AAD 50, W5ARV 24, W5AJG 24, W5BTU 19, W5AID 30, W5ANK 11, W5AL 8, W5AGH 43, W5ANE 15, W5AWT 6, W5BJX 11, W5AZC 9, W5BIV 7, W5BYP 22, W5RJ 5, W5BNO 4.

CANADA

MARITIME DIVISION

NOVA SCOTIA — SCM, A. M. Crowell, VE1DQ — VE1BV, C. S. Taylor of Stewiacke, our new RM, leads in traffic this month. VE1BW, former 'phone man, has been doing some DX CW work on 14 mc. VE1CW is new man on 7 mc. VE1BY gets out very consistently on 14 mc. VE1BL has been taking a whirl at 14 mc. 'phone. VE1DQ reports the 14-mc. band "dead" so far as DX goes. VE1AX is ready to tear a mighty hole in the air with the new hi-power 'phone. VE1AG is now off the air awaiting new "B" batteries. VE1DI is new 'phone on 3.5 mc. VE1DH is on 3.5 mc. CW.

NEW BRUNSWICK — All N.B. gang may report via your new RM, VE1AE, W. A. Kelso, Sussex, who is N. B. link in traffic route "I." VE1AE is lining up the active N. B. stations and will recommend RELIABLE ones for ORS. VE1AM — Fredericton is reported on 14 mc. VE1CY sets the pace in Moncton. Let's hear from VE1DC, VE1CX and VE1EI. Shoot in your reports, fellows, and watch your section climb to the top. Activity is now on the increase and with your cooperation the MARITIME DIVISION will show the way. LET'S GO!

Traffic: VE1BV 94, VE1AE 82, VE1CY 6, VE1BW 5.

ONTARIO DIVISION

ONTARIO — SCM, H. W. Bishop, VE3HB — As always Ontario IS still leading the traffic score for Canada. I would be glad to hear from stations interested in completing the Ontario network. VE3GT tops the traffic score again. Watch for his score in VE/W contest. Wow! VE3CD QSO'd BAHAMAS twice last month. VE3HA has changed his QRA to Y.M.C.A. Toronto. VE3CP says his traffic total would be different if he had more power. Hi. VE3JI blames Christmas holidays for low traffic total. VE9AL is QRL. VE3HW paid a visit to the gang down among civilization. VE3HC is getting FB reports on 'phone. VE3HN sends in his report via the net. VE3GK reports traffic. VE3SA and the Dominion Observatory are experimenting with 56 mc. VE3GP says their club now known as the Frontier Radio Club is getting all set for heavy traffic handling. VE3WF says watch his total. VE3HM is getting set for the International Tests. VE3HY reports the northern gang, VE3HK is talking about a 100 watter, VE3ET and VE3MR were visited by VE3HY. VE3AA has his ear open for traffic. VE3ID, VE3HW, VE3EN, VE3BG and VE3NY are heard quite often. VE3BV has a new crystal job and introduces a new ham, VE3JV, in North Toronto. VE3HV is getting lots of QSOs with his new MOPA. VE3AA says traffic is picking up. VE3IH is on 3.5-mc. 'phone. VE3HB will soon have a crystal. VE3IJ did some fine work in the VE/W contest. VE3GX says all his schedules are working 100%. VE3DB reports 1750 kc. FB. VE3PN is the new call for VE3CE. The Leamington are at last showing some activity in stations VE3LM and VE3TM. VE3AU is QRL Varsity. VE3AD reports traffic. VE3DW wants to know if any other OWs reporting. How about it, gang? VE3IR has a TNT job on 14 mc. VE3MR reports activity in North Bay.

Traffic: VE3GT 1047, VE3CD 146, VE3HA 139, VE3CP 35, VE3HB 63, VE3GP 46, VE3HN 38, VE3JI 37, VE3WF 37, VE3HY 61, VE3IH 22, VE3AA 14, VE3HV 18, VE3HW 7, VE3SA 7, VE3BV 6, VE3GK 4, VE3HM 4, VE9AL 10, VE3MR 50, VE3IR 93, VE3DW 62, VE3AD 74, VE3AU 49, VE3LM 50, VE3PN 8, VE3DB 18, VE3GX 598.

QUEBEC DIVISION

QUEBEC — SCM, Alph L. Blais, VE2AC — For a second term VE2AC has been reflected to the office of

STUMPED! HE DOESN'T KNOW THE "WHY" OF RADIO



Practical knowledge, but no theory. *Is that your trouble, too?* There's more to radio than just *how* to repair or construct apparatus — you must know *WHY* it operates after you do.

Our training in RADIO and TELEVISION *starts* where other courses *end*. We don't want beginners — men with a few years' radio experience are preferred.

GET DETAILS of THIS NEW METHOD of TRAINING

Absolutely no obligation. Just send the coupon or write for our interesting booklet. It describes everything — tells how to start in preparing yourself for a real future in radio. Mail the coupon *now* — while you think of it.

CAPITOL RADIO ENGINEERING INSTITUTE, INC.
WASHINGTON, D. C.

CAPITOL RADIO ENGINEERING INSTITUTE, INC.
14th St. & Park Rd., N. W., Dept. C-10, Washington, D. C.
Without obligation, please send me details about your home study training in ☐ Radio and ☐ Television.

Name
Address
Town State

DO YOU KNOW

that the latest *Radio Amateur's Handbook* is available in stiff buckram binding — \$2.00 per copy, post-paid?

When ordering a copy of this 9th edition, look at your present copy and determine if you want your next copy in more permanent form.

CQ — AMATEURS

West of Rocky Mountains

Send for your catalog of
Nationally Advertised
Transmitting and Receiving Parts
at Lowest PRICES

Amateur Headquarters
of the West

RADIO SUPPLY CO.

H. A. Demarest, President
912-14 So. Broadway Los Angeles, California
(W6FBI located in Building)



FEED the Goose that Lays the GOLDEN EGGS

IS your Service Department just a "Little Orphan Annie" — *unwelcome, but must be tolerated?*

If so, you need a NEW viewpoint. Service work earns PROFITS for service men who make replacements with high-quality, time-saving ELECTRAD Resistors and Voltage Controls, that PERFORM BETTER and COST LESS. Don't despise the Service Goose that lays the Golden Profit Eggs. FEED her!

Mail the coupon for literature that tells HOW.

175 Varick St., New York, N.Y.
ELECTRAD

ELECTRAD, INC., Dept. Q-3, 175 Varick St., New York, N. Y.

Send me literature on Electrad Replacement Resistors and Voltage Controls.

Name

Address

YOUR HOBBY CAN PAY DIVIDENDS!



... through the advanced knowledge you get at



CAPITALIZE your present radio knowledge. Probably with little more knowledge you will be ready to enter one of radio's interesting fields. Thus you make your hobby make a future for you.

America's oldest radio school—RCA Institutes—has a number of advanced courses in practical radio. Some of them are listed in the coupon below. Choose the one you want and get information about it.

You have a choice of two ways to study. First, at any one of the four fully equipped resident schools in New York, Chicago, Boston and Philadelphia. The instructors are carefully chosen, competent men. Courses are kept up-to-the-minute through RCA Institutes association with the largest research laboratory in the radio industry.

The second way to study is through extension courses, whereby you may learn at home. Special home laboratory equipment is available for many courses.

No matter which type of study you choose, you get the finest radio training it is possible to obtain. Yet the tuition costs are moderate in spite of all the advantages you get. Write now for your free copy of our latest catalog, which tells the whole story in detail. Thus take the first step toward making your hobby make a future for you!



QRA?

A Radio Corporation of America Subsidiary



RCA INSTITUTES, INC.

Dept. ST-3, 75 Varick Street, New York City

Please send me your General Catalog. I am checking below the phase of radio in which I am interested.

- | | |
|--|---|
| <input type="checkbox"/> Aviation Radio | <input type="checkbox"/> Talking Pictures |
| <input type="checkbox"/> Broadcast Station or Studio | <input type="checkbox"/> Servicing Home Entertainment Equipment |
| <input type="checkbox"/> Microphone Technique | <input type="checkbox"/> Television |
| <input type="checkbox"/> Disc and Film Recording | |

Name.....

Address.....

Occupation..... Age..... Call.....

SCM. I want to thank the amateurs of this division for their confidence in me and promise to do my very best during the two years that will follow. Special mention this month goes to VE2BB and VE2AP for the wonderful work done in assuring success to the Trunk Line "I." From VE2DL in Quebec City comes the good news that there are a few new fellows coming in soon. VE2DW is a new station in St. Joseph. VE2CL has resumed his regular work. VE2CA is resting after the heavy work but the XYL isn't idle, while the OM prepares for coming contests. Both radio clubs in Westmount and the South Shore are active. VE2AG is still fixing up his outfit. VE2BD-VE2BH-VE2DX-VE2CX-VE2CO are all working DX. VE2EM is busy on all bands. VE2CU has his DX also. VE2CO handles a fine traffic total. VE2CH is on 7 and 14 mc. VE2BG surprises the SCM with a very fine report. Did you ever eavesdrop on a conversation between VE2HV-VE2BE and VE2BG? If not, you don't know what a real ham rag-chew is. VE2HV is said to have the most elaborate and nearest to perfect ham station that ever was built. Many amateurs fail to report on the 16th each month. Please be more in the spirit of the game and let us know what's going on at your station.

Traffic: VE2AP 101, VE2AC 93, VE2BB 92, VE2CO 22, VE2CA 7, VE2BG 8, VE2CX 3, VE2CU 5, VE2BD 2, VE2BE 23.

VANALTA DIVISION

ALBERTA — SCM, Fred Barron, VE4EC — Sure is very FB, gang, the way reports came this month. Traffic increased to such an extent I had to appoint VE4DT Route Manager. He starts right off with a bang! VE4DQ comes next with a FB traffic total. And here's VE4JQ with lots of traffic. Well, well, glad to hear from you, VE4BZ. Glad to hear regarding the new ham, VE4BD, and would like a report from him. VE4DX reports a low power 'phone outfit on 3.5 mc. VE4EW is still exclusively on 3.5 mc. with his very FB 'phone. VE4EA is QRL trouble shooting on BC sets. VE4HM and his crystal are still very active. Where is VE4GD this month? VE4EC is very QRL. Keep up the good work and see what we can do next month.

Traffic: VE4DT 251, VE4DQ 67, VE4JQ 33, VE4BZ 24, VE4DX 3.

BRITISH COLUMBIA — SCM, J. K. Cavalsky, VE5AL — VE5FG handled a nice batch of traffic and also helped out in keeping some people in Prince George informed on the condition of a sick relative in the north. VE5AC now has two transmitters. VE5AM finds conditions rather tough. VE5AG has a schedule with Victoria. VE5FI is busy rustling parts for another set. VE5AL visited VE5CT and VE5DM. VE5EW turned in a nice total. VE5HP has nine schedules. VE5BR and VE5BL are experimenting on ultra high frequencies. VE5GT is giving code practise to about fifteen budding amateurs. VE5HR is running a daylight schedule. VE5EC's set has a serious case of colic. VE5DQ is breaking in a fifty watt on 3500.

Traffic: VE5FG 135, VE5HP 81, VE5EW 58, VE5HR 35, VE5AG 22, VE5BR 18, VE5AL 14, VE5AM 12, VE5AC 8, VE5DQ 1, VE5FF 10.

PRAIRIE DIVISION

MANITOBA — SCM, J. L. Green, VE4BQ — VE4IS leads the section in traffic. FB. VE4DK is very active. VE4AG is using a 50 watt. VE4JB is planning MOPA. VE4HR has acquired a 50 watt. VE4AC is putting Brandon on the map. VE4IU is on 7 mc. early each morning. VE4EF and VE4CP are heard on 7 mc. VE4BQ is now using a screen grid AC receiver. VE4GL popped his 75 watt. VE4CI worked VK and CM on 7 mc. We are hoping conditions keep improving so that our section can assist in the Coast-to-Coast Network.

Traffic: VE4IS 76, VE4CI 22, VE4AG 9, VE4DJ 6, VE4IC 3, VE4IU 2, VE4DK 1.

SASKATCHEWAN — SCM, W. J. Pickering, VE4FC — Traffic improved greatly this month! VE4BB, the RM, has done some good work in lining up the prairie end of the All Canadian chain. VE4AT is on consistently. VE4GR is trying to get an AC receiver to perk. VE4HU is now putting 30 watts into the last stage of his crystal outfit. VE4BF has put in a pair of mercury vapor rectifiers. VE4HX is on every day at noon. VE4JV is looking for a key-click antidote. VE4FD is working 'phone on 3.5 mcs. Let's have a report from every Sask. station!

Traffic: VE4BB 111, VE4AT 24, VE4GR 22, VE4HU 15, VE4BF 10.

(Continued on page 84)

TRANSFORMERS for CLASS B AMPLIFIERS

245 Class A to 210 Class B	\$12.00 Net
210 Class A to 211 Class B	13.50 "
210 Class B to 5000 ohm load	13.50 "
211 Class B to 5000 ohm load	15.00 "

Uniform frequency response 50 to 10,000 cycles

LIMITED QUANTITY NEW 50 WATERS \$6.00 each
GUARANTEED FOR USE AS AMPLIFIER OR OSCILLATOR

Shipped immediately postpaid on receipt of cash or money order

BROADCAST SERVICE

157 Chambers St.

New York City

For All Your
Experimental Work in
Sound and Television

Use

Telephoto Photoelectric Cells
(Caesium Argon Type)

Highest quality of tonal reproduction assured—lifelike and without distortion.

PAMPHLET ON REQUEST

TELEPHOTO & TELEVISION CORP.
133-135 WEST 19th STREET NEW YORK

UNIVERSAL MODEL "BB" 1932 VALUE — NEW DESIGN

No other 2-Button microphone can give such superlative value for such a low price. Extra large size. Extra rugged construction. Extra excellence of performance. Built especially for voice pick-up, public address work and amateur broadcasts. 24 kt. Pure Gold Spot Centers. Duralumin Diaphragm. Frequency range to WELL over 4000 cycles.

LIST PRICE
\$25.00



Guaranteed Performance at
Rock Bottom Price

Universal Microphone Co., Ltd.
1163 Hyde Park Blvd., Inglewood, Cal., U.S.A.

For *REAL SATISFACTION* use the best

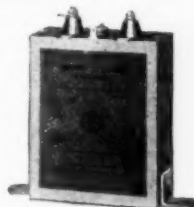
It's cheapest in the long run

Siemens & Halske Condensers are the world's standard for quality

YOUR NET PRICE IN U. S. A.

Working voltage Test voltage DC	1000 3000	1500 4000	2000 6000	3000 10000
1 MFD	\$2.25	\$2.70	\$5.25	\$12.00
2 MFD	3.90	5.10	8.10	19.50
4 MFD	6.60	8.70	15.60	36.00

(At your dealer or write direct)



Send for circular Q1

MORRILL AND MORRILL

Sole U. S. A. Distributors

30 Church Street New York City

HIGH AUDIO OUTPUT from small tubes



T-5140 Special Plate Supply Transformer — black crackle finish. Size 6 1/4 x 6 1/2 x 10 1/2. List Price \$24.50.

TUBE replacement economy and high efficiency justify your immediate investigation of these special and entirely new transformers, designed for use with Class "B" amplifier, using comparatively small tubes.

This group consists of plate supply unit, T-5140, for use with 210's. This unit when used as directed has practically a linear output characteristic, which is essential for satisfactory results. For coupling transformers we offer a special Input T-5100 and a special Output, T-5101. Thordarson circuit diagrams S-102 and S-108 should be followed to obtain best results.

Sent free on request

**Thordarson Electric
Manufacturing Company**
500 West Huron Street, Chicago, Illinois



Calls Heard

(Continued from page 65)

W3AFU, E. B. Judson, 4206 River Rd., N. W. Washington, D. C.

celai celao ce2ab ce3ce em1by em1fm em2fc em2ra em2sh em2sv em2wa em2wd em8yb on8mi on8mp et1aa et2ad et2af et2an et2aw ex2bt d4ggg d4iuf d4iju d4nnu d4uab ear10 ear16 ear18 ear94 ear116 ear121 ear128 ear136 ear185 ei8b f8aly f8eo f8ex f8fo f8fr f8gi f8ho f8jf f8jr f8od f8pq f8px f8ps f8rh f8ru f8sm f8saw f8sa f8tv f8tx f8um f8yj fm8ea fm8er fm8eg fm8hs fm8mat fn2c g2by g2df g2dh g2gf g2kl g2ma g2nh g2aw g2un g2wv g2aw g5by g5kl g5lw g5mb g5ml g5qa g5vm g6dh g6qb g6rg g6wk g6wt g6yk haf9af helff helrf hk1da j3de k1bpf k1kd k6eog la1g lu3de lu3dh lu3fe lu8djc nn1nic oa4c oa4g oa4j oa4q oa4y oa4s oa4bx oa4fq oa4fm oa4gn oa4or oa4uw oa4wf oz5m pa0dl pa0em pa0fb pa0jl pa0mm pa0ps pa0qf pa0ql pa0qq pa0xf pa0za py1ea py1em py1er py1fb py2bj py2ba py2bq py3aa py7aa py8ia py9ho sp1kx ti2fg ti2hv ti2tao v1yb vp2pa vq4erf x1aa x1d x2x xe yv3lo yx1b xqf low nams

Bruce L. Kelley, 120 Lenox St., Rochester, N. Y.
14,000-ke. band

b7x celao em2jm em2wa es3ht f8dm f8hr hj1ak j1ec k5aa lulca lu3de pk1jr pk3aj py1ib ti2fg velbv ve3ig ve3yh ve3rf ve4ar (fone) ve4ft vo8aw vo8mc w1we w2afq w2bg w2bro (fone) w3ux w4abr w4aba w4agr (fone) w4ajx w4aqn w4atr w4fi (fone) w4pi w5abo (fone) w5aea w5ai w5aib w5auf w5brr w5cab w5ga (fone) w5qf w5ql (fone) w5te w5ud w6ein w6aj (fone) w6cg (fone) w7aip w7su w8afm (fone) w8anq w8awx w8awu (fone) w8cfa w8cp w8cpe w8dla w8dod w8ecy w8een w8au w9adn w9ahk w9bid w9blz w9bhm (fone) w9brd (fone) w9bvi w9cfb w9cno w9do w9dun w9dqx w9elf w9eig w9fkk w9hkh w9mv w9rh yn6br x9a xx3ns zc2a 33r

W2BEB, William Adamovsky, 415 E. 75th St., N. Y. C., N. Y.

7000-ke. band

ca5c celah em2gu em2gr em2jm em2kw em2lc em2mm em2na em2ra em2sv em2wa em2wd em2ww em5ea em6ep em7ah em8uf em8yb ex7e f8rt fx7c hc1fg hb7c hb8x k4aan k4acf k4aop k4bu k4es k4kd k4rj k4rk k4ry k4ug k5aa kdv5 k6aja k6auq k6boe k6dmm k6dy k6dvs k6ebr k6erh nn1nic nn1sc ndg oa4a obe om2ac oxxb x1aa ti2hv ti3la vetis vk2gp vk2jr vk2hs vk2ja vk2kj vk2ng vk2no vk2oc vk2ow vk2ry vk2sa vk2sf vk2tx vk2xi vk3as vk3bw vk3ek vk3gp vk3jt vk3ml vk3pr vk3wl vk3ab vk3aw vk3zz vk4fi vk4ju vk4vj vk4wo vk5aj vk5dq vk5gr vk5hg vk5jw vk5pk vk5rh vk5wr vk5yk vk6bo vk6er vk6ow vk6wi vk7ch vo8a vp2pa w6aap w6abb w6abm w6acl w6acm w6adk w6adt w6aem w6ahu w6ahz w6aid w6ajq w6akb w6akx w6alu w6am w6amo w6ams w6and w6ann w6anq w6aoa w6aoe w6aor w6apd w6arm w6aro w6aqw w6arp w6asj w6avo w6avp w6axm w6azn w6bax w6bbe w6bc w6bcd w6bdp w6bee w6bek w6bfa w6bfb w6bfh w6bfq w6bgs w6bgv w6bik w6bja w6bkm w6bkk w6bpl w6bow w6bqd w6bqp w6brw w6bes w6bav w6buo w6buu w6bva w6bvs w6bwd w6bxf w6bxi w6byj w6bad w6bzo w6cae w6cah w6cap w6caw w6ebb w6ecd w6ecw w6edh w6edv w6cee w6cek w6cf w6ege w6egp w6chj w6chl w6cjs w6ckq w6cla w6cni w6coz w6cpe w6eri w6etp w6etx w6cug w6eul w6cuq w6cuz w6cvf w6cgv w6cvw w6cxh w6cxw w6cyq w6cyv w6dak w6dat w6dde w6de w6dep w6det w6dfu w6dgu w6dhp w6dhy w6dio w6dis w6dkp w6dkw w6dln w6dnp w6dow w6dpl w6dpv w6dq w6dqg w6dqv w6dru w6dso w6dst w6dsz w6dtd w6dte w6dtj w6duc w6dvv w6dxi w6dxw w6dyp w6dzb w6daz w6dzu w6eak w6ebg w6ecm w6cep w6efe w6efr w6efw w6ege w6ehi w6ehy w6eij w6ein w6eja w6ejn w6ejo w6eju w6ejs w6eke w6ekl w6ekp w6emi w6ens w6env w6epb w6eqb w6eqx w6err w6ert w6esi w6etg w6etj w6erm w6ewk w6exq w6eyc w6ezk w6esq w6fbw w6fbx w6fdl w6fdu w6fdw w6ffp w6ffw w6kh w6ks w6qu w6rp w6ue w6ue w6vb w6wo w6xxu w6al w6as w6abx w7aec w7awi w7ayr w7bfo w7big w7bjq w7bjx w7bka w7bke w7gj x1a x1aa x1ax x1d x1m x1u x9a x2ia yn1nic yslfm sl1ar sl2ac sl2bi sl2ce sl2cl sl2fp sl2eu sl3ai sl3aq sl3as sl3bb sl3ce sl3cm sl3ct sl4aj sl4am sl4ap sl4bt

A NEW QST BINDER

A Dupont fabrikoid material of waterproof and oilproof imitation leather in a rich wine color, which matches the color of your present binders. Instead of metal wires, it has well-designed strong metal strips to conveniently place your copies in the binder—13 such strips, too—12 for the yearly supply of QST and one for your QST index. You'll like this binder, and it doesn't cost any more either.

(Holds 12 issues of QST and index)

\$1.50 each, postpaid

AMERICAN RADIO RELAY LEAGUE

38 LaSalle Road, Hartford, Conn.



Massachusetts Radio and Telegraph School

18 Boylston Street, Boston

Send for Catalogue

Tel. Hancock 8184

Established 1905

VT211 Bs \$8, VT866 As \$2.85

VT210 As, 15 watt, R.F. tested \$2.50

Also 203As, 845s and many others

Remember VTEs are the tubes with the money back guarantee

VACUUM TUBE EXCHANGE

Ridgefield, New Jersey

M. C. JAMES

252A Loma Ave., Long Beach, Cal.

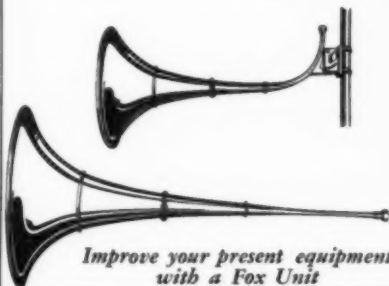


Super Akra-Ohm Resistors

Bulletin 150-G is a special booklet issued by us which fully describes the many uses for Shallcross Resistors in multi-range meter circuits. It also contains valuable charts and wiring diagrams. If you will send 4c in stamps, we will gladly send you a copy of this valuable booklet.



FOX ALUMINUM TRUMPET HORN



Improve your present equipment with a Fox Unit

are setting entirely new standards of sound quality. Its importance to the industry can hardly be overestimated. Wherever sound amplification of real quality and volume is desired, this new horn out-demonstrates anything yet developed. Clear, bell-like, and astonishingly realistic in tone—light in weight—and free from all the old dangers of exposure, humidity and atmospheric changes; it is truly a powerful factor in the service which any installation offers.

Pole mounting of some kind is unavoidable in many sound projection applications at football stadiums, ball parks, fight arenas, airports, or outdoor reviews and conventions in general. Overall length of 6 feet—with 32-inch bell.

FOX AMPLIFYING COMPANY

625 Board of Trade Building

TOLEDO, OHIO, U. S. A.

If you want to SAVE MONEY

on your radio purchases with-
out any sacrifice of quality
you need a copy of our new

FREE BARGAIN BULLETIN
Send for it now!

MARCH SUPER SPECIALS

ROYAL HEAVY DUTY TRANSFORMERS

Powerful and sturdy! Carefully constructed of the highest grade materials. Heavy duty windings and large, over-size silicon steel core give excellent regulation. Completely mounted in neat cast aluminum cases with leads to terminal board. Guaranteed for one year against any defect. Expressly designed for transmitters and power amplifiers. Insulated for 10,000 volts. It pays to buy the best!

Type	Voltage	Watts	Lbs.	Price
A	2500-1500-0-1500-2500	850	30	\$11.95
B	2000-1500-0-1500-2000	850	28	11.45
C	1500-1000-0-1000-1500	375	19	8.45
D	750-0-750	250	14	4.95
F	750-0-750, 7 1/2 CT., & 7 1/2 CT.	450	18	6.95

The following are in neat brown crackle finished metal cases. Insulated for 1500 volts.

G	1500 CT., 7 1/2 CT., & 2 1/2 CT.	275	14	4.25
H	1200 CT., 7 1/2 CT., & 2 1/2 CT.	200	11	3.65
I	800 CT., 5, 2 1/2 CT., & 2 1/2 CT.	150	9	3.50
K	700 CT., 5, 2 1/2 CT., & 2 1/2 CT.	150	9	3.25
L	750 CT., 5, & 2 1/2 CT.	100	5	3.15

NOTE: The above prices are good this month ONLY, and are FOB Minneapolis, Minn.

GARDWELL CONDENSERS

At Super Special Prices. This month only

Same Day Shipments. Direct from the factory to you

Type	Price	Type	Price	Type	Price
123-B	\$2.92	191-E	\$2.35	411-B	\$2.16
137-B	3.53	192-E	2.92	412-B	2.55
141-B	2.50	197-B	4.20	413-B	3.30
152-B	2.79	T-199	5.95	501	2.70
147-B	5.95	201-E	2.35	502	4.20
154-B	2.35	202-E	2.79	503	5.95
156-B	4.20	401-B	1.24	504	8.95
157-B	7.20	402-B	1.30	510-B	19.20
159-B	2.35	403-B	1.35	511-B	2.40
164-B	2.98	404-B	1.41	512-B	7.20
166-B	44.50	405-B	1.47	603-A	1.03
168-E	2.50	406-B	1.62	605-A	1.18
167-E	2.35	407-B	1.77	607-A	1.32
169-E	2.79	408-B	1.56	609-A	1.32
T-183	5.95	409-B	1.68	611-A	1.47
188-B	2.35	410-B	1.92	613-A	1.47

All Other Types at Lowest Prices

Copper Tubing. Soft drawn, clean stock. Full 3/4 inch. ROYAL Porcelain Stand-off insulators. "The stand-off that is better." Black or White. 10c each. 94c per doz.

ERLA Uncased Double button microphone transformers. 200 ohm per button. Can also be used for single button mikes. Special Price. \$1.85

ACME Enamelled Antenna Wire. No. 14 Solid, 100', 29c. 200', 60c. No. 12 Solid, 100', 42c. 200', 85c.

GENERAL ELECTRIC 5 Henry, 1000 Milliamperes Filter Chokes. In neat metal case. 5000 Volt insulation. 25 Ohms, 11 Lbs. Special, \$1.50 each. Four for \$4.95.

MERSON and TUNGSO Electrolytic Condensers. Metal cases! 8 Mfd., 450 Volt. Put a quantity in series for high-voltage self-healing condensers. Four for \$1.75. Each, 48c.

KELLOGG Hand Microphones. Sold in Feb. 1931 QST for \$6.50. Very sensitive. Designed for Ham Fone, public address and home recording. While They Last, \$2.45

Quality Merchandise

Quick Service

Lowest Prices

HARRISON RADIO CO.

189 Franklin Street Dept. T-3 New York City

Communications Department

(Continued from page 80)

Traffic Briefs

Sixty-two contacts on schedule without once being unable to connect is a record reported recently by W3SM and CM8YV. Their schedule is still going strong and makes a good route for Cuban and Porto Rican traffic.

On October 2, 1931, at 3:00 a.m. E.S.T., W3AGH logged ZT6K on the 3500-ke. band; and at 6:00 a.m., on October 5th, he tuned in ZL2AT. Let's have more reports on DX worked or heard on 3500 ke. "Thar's internash'nul QSOs lurkin' in them thar kiloyceles!"

W2BDN and VE2AC offer the suggestion that all Official Relay Station appointees sign "ORS" after their CQs or calls. This would enable all operators to better pick stations through which to route traffic since one would know by the sign-off whether a station was ORS. If you hear an operator sign "ORS" you may feel reasonably sure he is a reliable man and one who never lets messages die on his hook.

The first woman in Hawaii to receive a license as amateur radio operator signs K6OW (an appropriate call!) and is Mrs. Otis Hill, wife of our well-known Route Manager, K6AJA. Several other Hawaiian women are about ready to take the examination, one of them being Mrs. K6FCX. Looks as though the "Radio Widows" of Hawaii had determined to find out why "ham radio" is so fascinating to the OMs.

"Guess ours was the first G-W QSO on 3.5 mc. this season," says G6RB to W2CTA on a QSL confirming their contact of November 26, 1931. They were QSO at 2:20 a.m. E.S.T. W2CTA reported G6RB's signals QSA3 R6, and received a report on his own signals of QSA5 R7.

Traffic for Ecuador? Shoot it over the W9UM-HC1FG circuit and be sure of delivery.

W2BGO, W2AES and W2BPP are coöperating with the New York City Police in testing preparatory to erecting their BC stations. The amateurs of Quincy, Mass., under the leadership of W1AKY, are doing similar work for their local police, and we expect to have a full account of their coöperation in the near future.

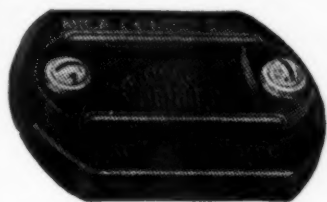
Eric W. Trebilcock of Moonta, South Australia, writes as follows relative to reception of KGEK, the schooner Northern Light (Bill Crabbe, W6ESW, operator), on 500 ke. (600 meters): On "October 21, 1931, at 7:40 p.m., South Australian time, I heard KGEK QSO G5MR (S. S. Larga Bay) on 500 ke. and ask the latter to tell coast station VIM (Melbourne) to commence sending traffic for KGEK on 670 meters. The signals of KGEK were QSA4 R4, but QRM was bad. I was using a two-tube receiver at the time, and QRB of KGEK must have been in the vicinity of 400 miles from me, in southeasterly direction."

At a time when the Northern Light, KGEK, was having difficulties and had rush traffic for Chicago, the messages were handled via ZL3CC to W7BB from where they were relayed to Chicago via Western Union. All replies were handled within forty-eight hours.

While a party of W9EBO's friends were enroute to Havana, Cuba, he got in touch with CM2WA and sent a message of introduction. CM2WA met the party upon their arrival and showed them many places of interest during their stay at the Cuban capital. Another example of amateur radio spirit!

K4KD and VE3DA have been QSO on each of the three popular band, 3500, 7000 and 14,000 ke. Neither station has worked any other station on all bands and the operators believe their feat is a record. How?

W4NE recently heard a new abbreviation used by W4AGY and W4QL. They called some one's signals "FDC." Upon inquiry we learn that it stood for "Funny DC." This quite aptly describes many signals heard these days.



SANGAMO MICA CONDENSERS

Are Accurate—Stay Accurate

Where accurate dependable condensers are required, specify Sangamo. These units are manufactured particularly to meet the demand for a quality condenser reasonably priced. Also available in 5000 volt rating in capacities from .00005 to .002 Mfd.

Write for booklet describing this
complete line of condensers

Sangamo Electric Co.

Springfield, Illinois



Low Range FUSES

Instrument Littelfuses: Amps.:
1/100, 1/32, 1/16 — 20c ea. 1/8,
1/4, 3/8, 1/2, — 15c ea. 1, 2, — 10c
ea. For milliammeters, ham rectifiers,
etc. Use 1/8 for radio B circuits.
High Voltage Littelfuses: 1000,
5000, 10,000 volt ranges in 1/16, 1/8, 1/4, 3/8, 1/2, 3/4, 1, 1 1/2,
2 amps. Renewable. Price — 35c to \$1.35 each. Get new catalog
No. 4-A.
"Quicker than a Short-Circuit"

LITTELFUSE LABS.

1772 Wilson Ave., Chicago

J. T. Rooney, B.Sc.

Pioneer Piezoelectric Crystal Maker

Crystals finished to any
practicable specifications

160-80 meter band Crystals. \$4.50

50 Woodett Place

Buffalo, N. Y.

Hatry and Young, Hartford

Filament transformers — 2 1/2 v. 8a. \$1.87; 7 1/2 v. 3a. \$1.98; 2-7 1/2 v.
3a. one insul. 500v., \$2.98; Pilot 1 1/2 v. 6a., 2 1/2 v. 3 1/2 a., 5v. 1/2 a.
\$2.98; Pilot 2 1/2 v. 9a., 2 1/2 v. 3 1/2 a., 5v. 1/2 a., \$3.75; 2 1/2 v. 10a. for
866s \$4.98.

Tubes — Ceco 866 \$2.95; 280M 300v. 300 ma M.V. \$1.98; guar.
235's 95c, quick heat. 224 95c; 227, 59c; 280 59c. 30 day guar'd.
210, 281, 250, \$1.98 each.

Audio filters b.p.-l.p. QST type built to order. Parts in stock.

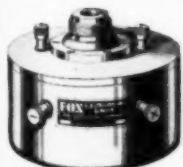
Standard radio parts lines in stock at amateur prices and discounts.
Write for prices.

Output transformers — low-priced. 2-245 to voice coil 98c; 2-247
to v.c. 98c; 1-247 to v.c. \$1.35; 1-247 to magnetic or v.c. \$2.47;
2-247 to magnetic or v.c. \$2.10; Thor. 1-247 to v.c. \$3.55; 2-247 to
v.c. \$3.55. Also transformers up to \$22 list for '50, '10 tubes, etc.

Condensers. Pitch-dip. 1000v. 1Mfd. \$1.09; 800v. 99c; 600v. 59c;
600v. 4Mfd. 99c; Electrolytic 8 Mfd. 69c; Inverted 72c; 3-8 \$1.74;
Aerovox dry elec. 8 Mfd. \$1.18; 2-8 \$2.24; 3-8 \$3.19.

Receivers: R.E.L. 278, National A.C. or D.C. SW-3, A.C. or D.C.
SW-5, A.C. SW-45, Power-packs, coils in stock. Write for prices.
Feb. QST page 9 rec. made to order \$85. Parts only, less shield-cans,
base and dial \$38.95.

A NEW DEPENDABILITY IN SOUND EQUIPMENT



Improve your present
equipment with a
FOX Unit

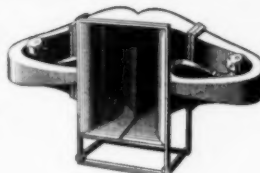
Fox Units not only command attention for their
output volume and tone value — they offer
definite, exclusive coil and diaphragm features
that insure continuous and trouble-free service.

The Fox Electro-Dynamic Unit and the Fox
Rams Horn is a combination that out-demon-
strates anything on the market.

FOX AMPLIFYING COMPANY

625 Board of Trade Building

TOLEDO, OHIO, U. S. A.



Complete sound en-
gineering service.
Estimates free for
special work

1932 SPECIALS

COLUMBIA MONITOR. Accurately Calibrated. Completely shielded in aluminum case. Equipped with Vernier dial. Three coils supplied for 20, 40, and 80 meter bands. Complete with tube and batteries.....\$9.00



RCA LICENSED TUBES

Real good tubes, made to stand the gaff. Unconditionally Guaranteed for 90 days!

UX112A.....	55c	UX226.....	45c	238.....	90c
UX120.....	70c	UY227.....	45c	240.....	90c
UX171A.....	55c	230.....	70c	245.....	50c
UX199.....	65c	231.....	70c	247.....	85c
UX199.....	65c	232.....	85c	250.....	1.45
UX201A.....	48c	233.....	90c	551.....	85c
UX210.....	1.35	235.....	85c	280.....	50c
UX222.....	1.10	236.....	90c	281.....	1.25
UY224.....	60c	237.....	75c	866.....	2.95

WESTERN ELECTRIC—211E, 50 watt tubes. New. Guaranteed.....Special \$8.00

SPECIAL—The only practical mercury vapor 280 tube yet produced. Guaranteed.....\$2.49

COLUMBIA POWER TRANSFORMERS

A quality line of transformers. All mounted, with leads brought out to lugs on terminal boards. Guaranteed for One Year!

Type	Wattage	Voltages	Price
A	200	600-0-600, 7 1/2 ct, & 7 1/2	\$3.75
B	250	750-0-750	4.95
C	350	1000-0-1000	7.00
D	500	1500, 1000-0-1000, 1500	9.35
E	800	2000, 1500-0-1500, 2000	12.85
F	250	750-0-750, 7 1/2 ct, & 7 1/2	5.75
G	400	750-0-750, 7 1/2 ct, & 7 1/2 ct	7.45
H	150	350-0-350, 5, 2 1/2 ct, 2 1/2 ct	3.75
K	100	285-0-285, 5, 3 ct, 2 1/2 ct	3.45
M	150	400-0-400, 5, 2 1/2 ct, 2 1/2 ct	3.95
N	150	300-0-300, 5, 1 1/2, 5 ct, 2 1/2 ct	3.75
R	750	2500, 1500-0-1500, 2500	14.35

STAND-OFF INSULATORS, similar to General Radio. Each—10c, Dozen—85c.

COLUMBIA FILAMENT TRANSFORMERS. An efficient, sturdily constructed job. All secondaries center-tapped. Deduct 10% from these prices if no center tap is desired. **10,000 VOLT INSULATION!**

Voltages	12 watts	25 watts	50 watts	100 watts
2 1/2	\$1.25	\$1.95	\$2.50	.....
2 1/2 & 2 1/2	1.50	2.25	3.75	\$3.75
7 1/2	1.25	1.95	3.25	4.45
7 1/2 & 7 1/2	.....	2.25	3.95	4.95
10	.....	.....	3.40	4.50
5	.....	.....	3.25	4.00

ELKON BONE DRY ELECTROLYTIC CONDENSERS. 500 peak voltage. 8 mfd.—75c, 4 mfd.—60c.

GENERAL ELECTRIC POWER TRANSFORMERS. 150 watts, supplies 750 volts, center-tapped. 5 volts, and 2 1/2 volts. Excellent for 245 transmitters.....\$2.35

GENERAL ELECTRIC 30 henry, 150 mill chokes, \$1.50.

COLUMBIA 30 henry chokes. Very efficient, ruggedly built. Mounted. Special, 200 mills, \$2.40; 120 mills, \$1.30.

Send for our new catalogue. It's free!

TERMS: Cash or C.O.D. No deposit required.

COLUMBIA SPECIALTY CO.

925 Westchester Avenue

New York, N. Y.

Since 1927



QUALITY CRYSTALS

RE-GRINDING

After inspection, we will re grind your crystal and calibrate it, for.....

\$3.50

Herbert Hollister / Merriam, Kansas

Merriam, Kansas, is a suburb of Kansas City, Mo.

We are all set

to handle
rush orders
for the

New Phone Bands

SUPER-POWER CRYSTALS

1715 to 4000 Kc.....	\$7.50
7000 to 7300 Kc.....	12.00
Blanks (one-inch).....	2.50
Holders.....	2.50

VE1DQ worked OH5ND and OH5NG with his c.e. 14-me. 'phone getting a report of QSA3 and taking an International test message reply from OH5NG. FB!

An "LU" heard at K4KD had the right idea. He sends "CQ DX South American stations QRT." Hi That ought to get results.

If you've got a call book, look up W5FA. And that isn't the half of it—down in Mendham, N. J., there is a member of the A.R.R.L. named George Washington, Jr. Awake, ye patriots!

Canadians note! The "VK's" are shouting for more "VE" contacts on 14 mc. VK2JZ would like to know the best time for VE-VK QSOs. VE5AW is the only VE heard or worked at VK2JZ recently on 14 mc. What's the story, VE's?

Those who have worked or heard PK6CH or PK7CH will be interested in knowing that the operator is W2CHU. He has been using those calls in Borneo while located there with the General Talking Picture Company.

From the looks of a few message books he has seen, W6DQH thinks the word "Relayed" on the monthly report cards should be spelled with two "D's." What does he mean, gang, what does he mean?

ZL2FM reports hearing K6COE's 3.5-mc. 'phone QSA4 R6 over a long period of time. FB.

Standard Frequency Transmissions Revised for New 'Phone Bands

(Continued from page 37)

W9XAN: Elgin Observatory, Elgin National Watch Company, Elgin, Ill., Frank D. Urie in charge.

W6XK: Don Lee Broadcasting System, Los Angeles, Calif., Harold Peery in charge.

REPORT BLANKS

Blanks for reporting on the S.F. transmissions will be sent postpaid upon request. Just send a card or message to Standard Frequency System, QST, West Hartford, Conn., asking for s. f. blanks.

WWV 5000-KC. TRANSMISSIONS

The 5000-kc. transmissions of the Bureau of Standards station, WWV, are given every Tuesday from 2:00 to 4:00 p.m. and from 10:00 p.m. to midnight, E.S.T. The accuracy of these transmissions is now better than 1 cycle (one in five million). Information on how to receive and utilize the signals is given in pamphlets obtainable on request from the Bureau. Communications concerning these transmissions and reports on their reception should be addressed to Bureau of Standards, Washington, D. C.

— J. J. L.

'Phone Operator's Examination Ready

(Continued from page 21)

Division's letter, they inform us and they have advised the supervisors that the possession of a broadcast operator license, either limited or unlimited, does not entitle the holder to operate an amateur station. The intention of these paragraphs is merely to indicate that such licensees will not be required to pass the special examination. But if they also hold an amateur operator

MARCH SPECIALS

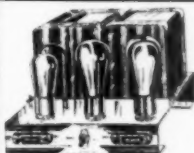
866 Filament Transformer, \$4.35
 2 Heavy D. 866 with Filament Transformers.....11.95
 RCA Wave Traps......65
 Excel Noise Filter..... 2.85
 Speed-Bug Tele. Key.....10.25
 Utility Heavy Duty Transformer..... 2.25
 (Will handle 5 Heater tubes 1-280 and 2-245 or 247's)
 Pentode Tube Adapter..... .50
 (Replace 245's)
 Oxford Dynamic Speaker, 10-inch..... 5.95
 (AC operated with 280 tube)
 Grebe, Type MU-1 Chassis 9.35
BATTERY OPERATED 5-TUBE BROADCAST RECEIVER BRAND NEW
TUNES 150 TO 550 METERS WITH LOW WAVE EXTENSION

ODEON LO-RIPPLE Mercury Vapor Rectifiers

866 TUBES
 Guaranteed
SPECIAL \$2.85



866 HEAVY DUTY
 Guaranteed
\$4.50



NEW LOFTIN-WHITE
 Direct-Coupled Amplifier
 Completely Wired
FULLY GUARANTEED

Model 245.....\$9.95
 Model 247 Pentode.....10.95
 Kit of Tubes.....
 Model 245.....\$2.25
 Model 247.....2.50

MARCH SPECIALS

TUBES
 All Guaranteed Firsts

Vacuum, 280..... \$45.
 Vacuum, 281..... 1.35
 Power, 210..... 2.00
 Power, 250..... 2.00
 Heater, 227..... .30
 Heater, 224..... .50
 Heater, 551..... .75



Rectifier Charger Bulbs

.06 Amps. \$2.15
 2. Amps. 2.15
 5-6. Amps. 3.95
 15. Amps. 6.85

Write for Quantity Discount

20% With Order—Balance Shipped C. O. D.

Send Postage or Express Charges

Mail Order to:

30 CLINTON STREET ODEON MANUFACTURING CO. NEWARK, N. J., U. S. A.

ANNOUNCING MY RE-ENTRY INTO BUSINESS AS
PACIFIC COAST REPRESENTATIVE
 for nationally known lines

DON C. WALLACE (W6AM-W6ZZA)
 4214 Country Club Drive
 Long Beach, Cal.

(Am open to represent one additional line at this time)

COLLINS CRYSTAL TRANSMITTERS

are fast becoming the popular choice of both the old-timer who has learned to appreciate the value of trouble-free, efficient performance on all bands—and also the beginner who wants to start right. ●Write at once for full details and photographs. Units from \$33.95 up with carrier powers of 30 to 300 watts. Also a complete line of power supplies, modulator and input equipment, relay racks, quartz crystals, etc.

COLLINS RADIO TRANSMITTERS
CEDAR RAPIDS, IOWA

(Arthur A. Collins, W9CXX)

All You Need to Learn TELEGRAPHY

Morse or Continental with **Teleplex**

Learn Telegraphy—the world's most fascinating profession—by hearing real messages—sending them. Interesting—simple—you learn quickly—at home.



TELEPLEX is the Master Teacher. Used by U. S. Army, Navy and leading radio and telegraph schools. Entirely new code course in 12 rolls of tape. During last ten years, **TELEPLEX** has trained more operators than all other methods combined.

Write for Folder Q-3.

TELEPLEX COMPANY

76 Cortlandt Street New York



.. Includes Radio-phone, Television and Wireless Telegraphy

PORT ARTHUR COLLEGE

PORT ARTHUR (world-known port) TEXAS

Say You Saw It in QST — It Identifies You and Helps QST



U. S. GOVERNMENT ACCREDITED TRAINING SCHOOL

In three to seven months, we train you to pass government examination and secure your license. Examinations are held in our school about every 90 days. Our graduates are operating broadcasting stations in all parts of America, and many are travelling the seven seas as ship operators. If further details desired, mail coupon.

Port Arthur College, Port Arthur, Texas
 Please send details concerning Radio Course to

Name

Street or Box

City and State

OM! Buy from us and SAVE!

WE OFFER YOU THE GREATEST BARGAINS
AT LOWER PRICES!

Jewell 5-10-15-25-50-100-150-200-300-500 milliammeters...\$5.15
Weston 5-10-25-50-100-150-200-300-500 milliammeters...5.75
Standoff Insulators — 10c each...1.00 doz.
Sangamo 5000 volts cond. .0001 .00025 .0005 .001 .002...1.00
R.C.A. Hand Mikes with cord...2.49
CeCo 866 Mercury Vapor Tubes — new — guaranteed 6 months 3.65
866 Mercury Vapor Tubes — new — CeCo make...2.35
Pilot Sockets and all other Pilot products...40 and 10% off
National — NEW SW3 and SW5 D.C. or A.C. Thrill Boxes Lowest
Prices!
REL Short Wave Sets...\$27.50
RCA — Brand New — UX-210...3.95
RCA — Brand New — UX-250...3.35
Condensers — guaranteed — 1 mfd. 750 D.C. working voltage —
card board cased...65
Condensers — guaranteed — 1 mfd. 1000 D.C. working voltage —
card board cased...75
Uncased Condensers, 1000 d.c. working voltages: 1 mfd. 49c, 1 1/4
mfd. 55c, 1 1/2 mfd. 59c, 2 mfd. 65c, 3 mfd. 79c
Metal cased condensers — national known make — 1 mfd. 600 d.c.
working voltage...49
Flechtheim and Siemens & Halske Xmitting Condensers — NEW —
Special Prices
Utah d.c. dynamic speakers — 2500 ohms...3.98
Centralab Volume Controls — new — 5000 ohms...20
New Tung-sol 8 mfd. electrolytic condensers...32
New Mersham electrolytic condensers — S-8 mfd. 44c, S-18 mfd. 59c,
D-8 mfd. 98c, T-8 mfd. 1.29, T-36 mfd. 1.98, Q-52 mfd. 2.98
Special! 100 ft. no. 12 enameled solid copper aerial wire...50
200 ft. no. 12 enameled solid copper aerial wire...90
Automobile 6 tube receiver complete with tubes, suppressors,
batteries, dynamic speaker and cables — nothing else to buy, 39.50
R.C.A. Victor Hand Mikes — new — very special...2.75
245 Tubes — Marathon — new — limited supply...29
R.C.A. 48 Millihenry r.f. unmt. chokes...25
Peerless 85 Millihenry r.f. unmt. chokes...15
Amateur Call Books...80
Aluminum and Electrical Panels and Boxes for all Amateur uses —
all sizes — Lowest prices in country!
Bakelite and Hard Rubber Panels — all sizes...Prices very low!
Plug-in Coil Forms — moulded bakelite...33
Tip Jacks...05 G.R. type Plugs...06
Crosey — 30 henry, double chokes — cased...89
Crosey — 30 henry, single chokes — cased...59
BMS "Speed Bug" Adopted by U. S. Signal Corps...8.98
Signal Keys, Relays, Sounders and Buzzers in stock — Special
Prices!
New! Universal Model X — two button Mike — special...5.70
Plug-in Crystal Holders — dustproof — precision made...2.25
Get our prices on guaranteed Crystals — best made — Lowest
Prices!
G.E. Neon Tubes: 1/2 watt .45, 1 watt .50, 2 watt .67
We stock a complete line of supplies for "Hams" and Servicemen
too numerous to mention. Direct Distributors for all nationally
known radio manufacturers.
20% deposit must accompany each order — balance C.O.D. Include
postage on all orders. All parts doubly guaranteed!
No order too small for us to ship. Shipments made to any part of the
World. Foreign orders solicited. Write for prices on any part you
need. Our prices are the Lowest!

(Say you saw it in QST)

Write for free "Ham" bulletin — full of Big Bargains, Swift Service

"If It's Radio — We Have It"

MAURICE SCHWARTZ & SON

710-712 Broadway

SCHENECTADY, N. Y.

Get Started in RADIO

Write for free booklet telling about
this growing and most promising
industry. The radio operator is an
officer aboard ship. His work is light,
pleasant and interesting. He has
many opportunities to travel to all
parts of the world. You can qualify
in a short time in our well-equipped
school under expert instructors.



A new course in TELEVISION starting soon

Full information on request

Educational Department

WEST SIDE YMCA 4 West 63d St.
New York

license (or higher grade) and desire the unlimited amateur 'phone privilege, it will be endorsed upon their amateur operator license upon request, without further examination, by virtue of their possession of the broadcast operator license. As to subparagraph (d), the holders of the amateur extra first class operator license who have been authorized to operate "20-meter" 'phone will have this privilege extended to cover 3900-4000 upon request, but no more such authorizations will be made by virtue of that type of license and such applicants in future must pass the 'phone examination.

If you fail to pass the examination, you must discontinue 'phone work in the 3500-ke. and 14-mc. (80- and 20-meter) bands after March 31st, but you may continue in the 1875-ke. and 56-mc. (the new 160-meter and the old 5-meter) bands. After three months you are eligible for reexamination.

If you have not had as much as one year of licensed experience in the operation of a station, you are not eligible for certification for these bands and you must discontinue 'phone work in the 3500-ke. and 14-mc. (80- and 20-meter) bands after March 31st, but you may continue in the 1875-ke. and 56-mc. (160- and 5-meter) bands. When you have accumulated a year of experience in actual station operation, you are eligible for the special examination.

The new bands may not be used by anyone for 'phone work until 3 o'clock a.m. E.S.T., April 1st. After that hour the old regions that were open 'phone but that are not included in the new band — and particularly the 3500-3550-ke. region — may not be used by anyone for 'phone work.

All clear now? Good luck!

Radio Efficiency

(Continued from page 33)

give this tube a "break.") Following this same line of reasoning for the Type '45 and the Type '50 tubes, we arrive at 13.5% and 13%, respectively.¹

The rectifier tubes vary in their efficiency according to the amount of current being rectified. In the Type '80 tube there are 10 watts lost in the filament alone, whether we are using 10 or 100 milliamperes of rectified current. So here again we must take a specific instance — say, 80 milliamperes at 300 volts, which we will call useful load, since we cannot blame the rectifier for the watts lost in the voltage divider. The useful power load is 24 watts. The input power is 10 watts for the filament plus 15 (approximately) dissipated in the plate, or 25 watts total. The useful load is 24/49 of the input watts, indicating an efficiency of about 50% at this load.

The efficiency of the voltage divider, considered from a viewpoint of useful watts, is exactly nil. The heat created is not only useless but is undesirable. It is true that the divider is useful because it is the simplest means of reducing the

¹ Class B audio-frequency output amplifiers better this order of efficiency by three times and more; their use marks a big jump up the efficiency ladder. — EDITOR.

ARCTURUS ANNOUNCES

a line of TRANSMITTING TUBES,
POWER AMPLIFIERS and MERCURY
VAPOR RECTIFIERS

Arcturus has built into these new products the same superior qualities of construction and performance which have established Arcturus as the name for dependability and quality in the receiving tube field.

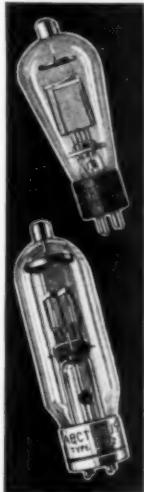
The two tubes of the series now ready for distribution are Mercury Vapor Rectifier No. E-766 and the heavy duty type Mercury Vapor Rectifier No. E-772.

Important Points of Superiority

1. Rugged construction.
2. Special oxide-coated filament—emission is distributed only over entire length of filament.
3. Uniform output voltage variation over wide range of current drain.
4. Constant output for hundreds of hours on intermittent life tests.

Write for details of the new Arcturus Mercury Vapor Rectifier Tubes Nos. E-766 and E-772.

Arcturus Radio Tube Company, Newark, N. J.



JACOBS SEPARATOR

Patents Pending



For the efficient and rapid construction of 2 wire R.F. feed lines used in conjunction with current and voltage fed Hertz antenna systems.

Price \$8.00 per dozen

CHARLES F. JACOBS (W-2EM)

270 Lafayette Street New York, N. Y.

CORNELL "CUB" CONDENSERS



Single mounting strap—can be attached to panel—initial cost is less—most flexible and easiest mounting—no loss in efficiency—reduces costs by cutting assembly operations—high insulation resistance—extraordinary dielectric strength. Write for Circular.

CORNELL ELECTRIC MFG. CO.

Long Island City

New York

AERO BARGAINS

10 Watt Transmitter using latest 247 Pentode tube supplied with plug-in coils for 20, 40 and 80 meter amateur bands. Completely wired, assembled and tested, less power supply. \$9.50

A.C. Power Supply for above transmitter complete with rectifying tube \$8.75
Aero Transmitter, 15 to 30 watt phone and C.W. in beautiful walnut cabinet. \$39.50

Including tuned plate, tuned grid oscillator with provision for crystal control. Wired for one or two UX 210 tubes. One or two UX 250's as modulators, two stages of speech amplification. Mounted in beautiful two toned walnut cabinet. Ample space for AC power supply. Price includes one Stromberg-Carlson microphone. \$39.50
Power Supply Unit for 15 to 30 Watt Transmitter \$19.75. Will deliver 600 volts 150 milliamperes for plate current. Has filament for 281, 210, 250, 227 and 226 tubes.

Aero Hi Peak Audio Chokes for your shortwave receiver gives the peak amplification which is many times greater than you get with just ordinary transformer amplification. \$3.00

Midget Power Transformer, 3-227 or 224 tubes, 1-247 or 245 and 1-280 tube, 700 volts C.T. Ideal for low-powered transmitters. \$1.95

Smallest Completely Shielded Screen Grid Coil available—\$3.55 each—matched set of 3—\$1.65.

Aero Pentode Auto Radio. \$20.00

Uses four 236 tubes and two 238 tubes. We guarantee a thousand-mile radius. Price complete with tubes, dynamic speaker, batteries and suppressors. \$39.50

World Wide 2-Tube Short Wave Receiver, \$11.75. Complete with set of 6 clip-in coils. Covers 14 to 550 meters. Can be used with any standard base tubes.

Low Power Transmitter, adaptable for phone or code. With plug-in coils. \$14.75

Short Wave Sets, one tube complete with 5 coils, 14 to 550 meters. \$6.45

Stromberg-Carlson telephone transmitter on desk stand. \$2.75

B Eliminator, Dry, 180 Volts, will operate up to 10 tube set, with 280 tube, fully guaranteed. \$6.75

AC-A.B.C. Power Packs, completely assembled. \$8.75

250 V.B. also has A.C. filament for up to 9-tube set. Can be used as B eliminator. Make your battery set all electric, or build your A.C. set around this pack. 280 tube for this pack, \$9.50 extra.

Aero Shortwave Converter Superheterodyne. Converts your AC or DC radio set into a short wave superheterodyne 15 to 200 meters. \$12.50

Send for Catalog

CHAS. HOODWIN CO.

4240 Lincoln Ave., Dept. P-8

CHICAGO, ILLINOIS

ALUMINUM BOX SHIELDS



Genuine "ALCOA" stock, silverplated finish. 5 x 9 x 6

\$1.80 — 9 x 14 x 7 \$4.65. 10 x 6 x 7 Monitor size

\$2.95. 5 x 5 x 5 Shield (like picture on left) \$1.00

ANY SIZE TO ORDER

Genuine BRANDES Phones using handles instead of headband. Made for R.C.A. \$1.95

Handles to fit all phones. each. .45

Hedgehog Transformers

Keying Relay for A.C. or D.C. \$1.95

19 R.P.M. Motor, A.C. or D.C. \$3.50

for remote control, etc. \$3.50

Selenium Cells. \$3.50

Skinderviken Button. .65c

C. R. L. IMPEDANCE COUPLED

1 STAGE AUDIO AMPLIFIER for Short Wave and Television. \$2.95

LARGEST VARIETY OF

RADIO PARTS IN THE WORLD

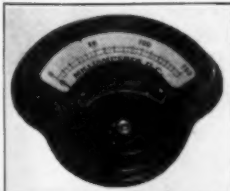
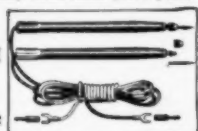
BLAN, The Radio Man, Inc.

89 Cortlandt St. New York City

"BUDDY" Test Prods

Always sharp pointed, using phonograph needles, 4-ft. wires, spade or phone tips. Colored nipples

identify each lead. \$1.50 pair.



A Big Scoop—WESTON Meters

BRAND NEW. In Original Cartons—Never Used. They were made up specially for a Sound Manufacturer, but due to unusual business conditions, they could not take them. These meters were not taken off panels, but are perfect and absolutely brand new. Special.....

\$5

Model
267

SPECIAL INSULATED SHAFT STUDS for one-quarter inch metal or bakelite panel mountings

List \$16²⁵

O-10 M.A. D.C.

O-20 " " "

O-30 " " "

O-150 " " "

O-15 V. D.C.

O-600 V. D.C.

The 600 volt meter has an external resistance



"The Home of RADIO"

45 VESEY STREET

NEW YORK CITY

Saw You Saw It in QST — It Identifies You and Helps QST

89



Oscillating Crystals

Precision ground, powerful oscillators

Unconditionally Guaranteed

80 and 160 meter bands, "X" or "Y" cut — calibrated to 1/10th of 1% or better and adjusted to within:

1/2 of 1% of specified frequency . . . \$6.50
+ or - 5 Kc. of specified frequency 7.50

40 meter band adjusted to within plus or minus 1% of specified frequency . . . \$10.00

1-inch oscillating blanks . . . 3.75

Unfinished Blanks . . . 2.00

Dustproof Holders, with nickel-silver electrodes . . . 2.50

175 Kc. Stenode Crystals . . . \$3.50
Special prices for quantities quoted on request

High or low frequency Crystals of all descriptions made to order

All our Crystals are made from finest quality Brazilian Quartz

We invite your inquiries

Write for any further information desired

**PREMIER CRYSTAL
LABORATORIES, Inc.**

74 Cortlandt Street New York City

HANDBOOKS

EXCHANGED!

In exchange for your old handbook and the small sum of Bucks 1 we will send you a copy of the new supervalueable 9th edition of

The Radio Amateur's HANDBOOK

and let you keep the old copy yourself — so you can see how vastly better the new one is. Seize this remarkable opportunity to-day!

A.R.R.L.

38 LaSalle Rd.

West Hartford, Conn.

Rush Ninth Edition Handbook!

(Name)

(Street or Box)

(City and State)

voltage to that required by the plates of the amplifier tubes, but it serves no useful power purposes.

The filter condensers are nearly 100% efficient. Practically every bit of charge that is put into the condensers during the rectifying part of the electric cycle is returned to the circuit during the rest of the cycle. A very small amount is lost in leakage and a small amount of heat is dissipated in the dielectric and in hysteresis. There is some loss in the chokes, varying widely with the amount of d.c. resistance, the value of the current and the amount and grade of the iron. The losses are relatively small, however.

There is a very high loss in the speaker, in spite of the improvements that have been made in that important unit of the radio set. While the author has no authoritative figures available from manufacturers, nor has he run any tests himself, it has been learned verbally from engineers of two very well known radio companies that a speaker is very good if it converts 10% of its electrical input into audible power.¹

Putting the radio set back together again, we shall consider it as a whole. Assuming a modern set having an input load of 100,000 ohms and an output tube of 1.6 watts, capable of being loaded to the limit on 5 microvolts input from the antenna, the total drain from the a.c. line will be approximately 60 watts. Following the same methods for the two power sources converging into sound reproduction in the loud speaker, as we did in calculating the efficiency of an amplifier, we arrive at the following results:

The antenna input power is 0.00025 millionth of a millionth watt! The output, in audible power, is 0.16 watt, a gain of 148 decibels. From the a.c. line to the loud speaker the drop in power is from 60 to 0.16, a loss of 25.7 decibels. The total gain is, hence, $148 - 25.7 = 122.3$ decibels, constituting an overall "efficiency" of 17 million million percent. Who said perpetual motion was impossible? In reality, the overall efficiency of the set, since the antenna power is negligible compared to that drawn from the power line, is a loss of 25.7 decibels; that is, $\frac{0.16}{60} = .267\%$.

These methods of calculating efficiency may meet with some criticism; but, after all, the problem is more theoretical than practical and results vary widely with different sets. Nothing has an efficiency of over 100% in spite of the "perpetual motion" we ran into in the preceding paragraph; but the methods followed, while not as conclusive nor universally applicable as we would like to have them, are at least productive of something different in the line of radio reading material, if nothing else.

¹ This may be giving the speaker a "break." Electrical to acoustical conversion efficiencies of 1% to 5%, with about 2% as average, are understood to be the rule. — EDITOR.



(1) natur
their
(2) any s
capita
tism
(3) parag
(4) contri
(5) month
(6) which
nature
can be
surplu
or app
for spe
Relay
paratu
comm
(1), (2)
regard

PLATE p
for quiet
pendabili
approach
B battery
electricall
scribes co
wire, silic
transform
units. Re
Cleveland

THE fine
most mod
Radiopho
complete
coils, indu
signs, buil
quest. New
copy. Ens
Warren, O

CRYSTAL
act frequ
identifies
when buyi
proximate
\$5.50. Du
manufact
ments fro
Masonic T

TRANSFO
prices, qui
currents (o
Laboratori
LEARN W
largest, en
Expenses
Wood Stre

GOOD cry
ceivers. H
SEND 25¢
Laboratori
TRANSEFO
prices, qui
currents (o
Laboratori

HATRY a
FOOD, am
\$2.85 oscil
Trial subsc
Radio, Har

COMPLETE
heterodyne
miss it. Oro
CRYSTAL
Radio Supp
CRYSTAL

KENNED
SELL — In
factory car
thory, Man
VE3JC sell
Want broac
QSL cards,
for free sam
Mass.

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.

(3) The Ham-Ad rate is 15c per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.

(6) A special rate of 7c per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League takes the 7c rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and takes the 15c rate. Provisions of paragraphs (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

PLATE power for your set, the very heart of its performance, for quietness, DX ability, lifelong permanence, absolute dependability, lowest ultimate cost, no other plate source even approaches the achievement of an Edison steel alkaline storage B battery. Built painstakingly; every joint pure nickel, upset electrically welded. Genuine Edison Electrolyte. Our list describes complete batteries, construction parts, enameled aerial wire, silicon steel. Available immediately, filament and plate transformers for the new 872-886 rectifiers, complete plate power units. Rectifier Engineering Service, 4837 Rockwood Road, Cleveland, Ohio.

THE finest in radio for amateur, broadcast and marine. The most modern short-wave receivers. Four to ten tube designs. Radiophone CW transmitters of any power or type. We make a complete line of apparatus, including speech amplifiers, filter coils, inductances, power units, etc. Any special apparatus, designs, built to order, using your parts if desired. Prices on request. New bulletin lists complete line of apparatus. Write for copy. Ensell Radio Laboratory, 1527 Grandview St., S. E., Warren, Ohio.

CRYSTALS: New! Different! The name Biley and the exact frequency (within 0.1%) engraved on every crystal. This identifies us and is your guarantee of fine quality. Look for it when buying one. Power-type (X) inch square supplied to approximate specified frequency: 1715-2000kc., 3500-4000kc.: \$5.50. Dust-proof plug-in holder: \$2.50. We are equipped to manufacture crystals to any precision and frequency requirements from 20kc. to 6000kc. Biley Piezo-Electric Company, Masonic Temple Bldg., Erie, Penna.

TRANSFORMERS made to your order. High quality, moderate prices, quick service. Write for quotations. Specify voltages, currents (or wattage) and frequency desired. Baker Engineering Laboratories, 2131 Curdes Ave., Ft. Wayne, Indiana.

LEARN Wireless (Radio) and Morse telegraphy. School, oldest, largest, endorsed by telegraph, radio and government officials. Expenses low. Can earn part. Catalog free. Dodge's Institute, Wood Street, Valparaiso, Ind.

GOOD crystals. Trade for meters, broadcast and amateur receivers. Herbert Hollister, Merriam, Kansas. W9DRD.

SEND 25¢ (postage cost) for latest amateur parts data. Kladag Laboratories, Kent, Ohio.

TRANSFORMERS made to your order. High quality, moderate prices, quick service. Write for quotations. Specify voltages, currents (or wattage) and frequency desired. Baker Engineering Laboratories, 2131 Curdes Ave., Ft. Wayne, Indiana.

HATRY and Young condensers, see page 85.

FOOD, amateur's manna: Reinarts' series of three articles on a \$2.85 oscilloscope: February, March and April Modern Radio. Try subscription four months, 75¢. See our other ads. Modern Radio, Hartford.

COMPLETE constructional data latest short-wave superheterodyne by L. W. Hatry, Modern Radio for April. Don't miss it. Order now. Modern Radio, Hartford.

CRYSTALS, \$5. DP holders, \$2.75. Silver-plated, \$5. Ellis Radio Supply, 3632 Wayne, Kansas City, Mo.

CRYSTALS: U-bet. W9BMT.

KENNEDY 110 two-step wanted. W1QW.

SELL — latest pilot all wave receiver complete. Like new. In factory carton. Best offer over fifty dollars gets it. D. H. Petithory, Manhattan Hotel, Pensacola, Fla.

VE3JC selling out. MOPA, two power supplies, recvr, monitor. Want broadcast receiver. 94 Division St., Kingston, Ont.

QSL cards, message blanks, stationery, snappy service. Write for free samples today. W1BEF, 16 Stockbridge Ave., Lowell, Mass.

CRYSTALS, one 7060kc. and one 7050kc. \$5 each. Cost \$8. One 3000 volt Hoyt d.c. voltmeter with external shunt. Brand new meter for \$20. W1AVJ.

NEW fone band crystals: Precision-type \$5. Regrind — exchange crystals. Prices reasonable. K & H Laboratories, 3327 College Ave., Kansas City, Mo.

WANTED — Navy IP-501 receiver or army type equivalent. W3ZI, 315 Beechwood Ave., Trenton, N. J.

SELL a.c. super wasp just rebuilt. New power pack, Booster, all complete with tubes — (\$35) thirty-five dollars. A. W. Shepherd, Chanute Field, Rantoul, Ill.

DON'T miss these: two-tube, 500 watt, crystal-controlled transmitter, March, by Boyd Phelps. Power from crystals: transmitting aerial without insulation; \$1.00 makes condenser microphone — to come in Modern Radio edited by Kruse and Hatry. Subscription four months 75¢. 20¢ copy. Modern Radio, Hartford.

BARGAIN: Practically new 50 watt transmitter and power supply built of finest parts. Transmitter and power supply separately housed in portable, heavy cabinets. Xmitter has three Jewell meters, National condensers, etc. Power supply uses 866 tubes, Thordarson transformer and finest parts. Complete with tubes at \$85.00. Photo. G. E. Webster, NBC Engr., 4900 Kenmore Ave., Chicago, Ill.

SELL a.c. superwasp in cabinet, \$20. Or what have you? W7CG, Weiser, Idaho.

20 new Dubilier mica trans. condensers, .004 mfd. 12,500 v.w. in cast aluminum case. Type No. CD158, \$8.50 each. J. B. Arnold, Woodlawn Hills, San Antonio, Texas.

ESCO M. G. 175 watt 110 d.c. 1000 d.c. 15 volt filament tap. Bargain, \$35. F. O. B. New York City, W2DI.

NEW Vibroplexes. Seconds accepted. Rebuilds \$10, shipped C.O.D. Lydeard, 28 Circuit, Roxbury, Mass.

FIRST money orders take following used bargains: \$52-\$15; Station Receiver-DC wide spread on all bands \$20 (has dragged in over 100 countries); Long Wave receiver-2 tube 2 circuit with hi ratio xmr and several coils \$5; Forest Service Station Charger with Tungar Bulb-1-13 "A" bats once — worth over \$100 new — in perfect condition \$40. W2BNX, 85-12 165th St., Jamaica, N. Y.

CRYSTALS — guaranteed high quality power crystals. Ground to your specified frequency. 3500-4000 kc. band, \$3.50. P. O. Box 68, St. Paul, Minn.

SELL — 210 transmitter \$15. Speech amplifier, modulator, \$13.50. Receiver, \$11.50. Penney, 35 Eutaw St., East Boston, Mass.

WANTED — 204A, tubes, meters, National SW3 a.c.d.c. receiver. Pay cash. W1AVV, N. Sacrison, Charles St., Stamford, Conn.

CRYSTALS: Neatly finished one inch square x cut power type. Guaranteed 1750-3500 kc. bands \$3. W8DLM, Rochester, Mich.

SELL or trade — G. E. 1 kva unmounted transformer, 1100-2200-3300-4400 volts each side of c.t., \$11. W8DLM, Rochester, Mich.

REGRINDING crystals. 3500 phone to 3900 phone two dollars. Grinding blanks to 3500 band, \$2.50, to frequency, \$3. Work guaranteed. Gartland, 1405 Kenmore Place, Brooklyn, N. Y.

MAJESTIC super-B eliminator \$5. Inductances \$4.50. Short wave receiver, \$15. Radiola VI (long wave) \$10. Superhet chassis, \$7.50. Twenty various receiving tubes, audio transformers, dials, etc. Louis Berkowitz, 849 Blue Hill Ave., Dorchester, Mass.

ALUMINUM boxes, properly designed and substantially made. Stock sizes or made to order. Write for details and prices. John R. Skronkal, 80 Mt. Vernon St., Ridgefield Park, N. J.

TRANSMITTERS, receivers or other equipment designed and built to specification. Can handle simple baseboard layout or fully mounted commercial type. Your parts used if desired. Engineering and construction guaranteed. Write for quotations. State your requirements in as much detail as possible. Holmes C. Miller, Radio Engineer, P. O. Box 105, Palo Alto, California.

CRYSTALS: Selected quality 160 or 80 meters, \$4. Blanks, \$1.75. Discount to dealers. Will trade. W8CXP, Sandusky, Ohio.

CLASSY photo QSLs. W8DNT, Rochester, Mich.

QSLs, request our samples and prices before ordering. Maleco, 1512 Eastern Parkway, Brooklyn, N. Y.

TRANSFORMERS, chokes, condensers at bargain prices. Write for surplus list. E. M. Osborne (W8BL), 4353 Chalmers Ave., Detroit, Michigan.

QSLs. Samples. W8FCC, Logan, Ohio.

QSLs, 300 two color, \$1.75. T. Vachovetz, Box 163, Elmsford, New York.

PUSH-pull 210 transmitter, complete. Tubes, power supply, \$30. 1200-0-1200, 250W power transformer, \$6. Two National 3000 volt 63 plate variable condensers, VV dials, new, \$8. Monitor complete, \$5. Jewell milliammeters, \$3. 500W 500 cycle alternator, new \$7.50. W9BUA, Carthage, Ill.

QSLs, 90¢ per hundred, two colors. W9DGH, 1816 Fifth Ave., N., Minneapolis, Minn.

PHOTO QSLs, highest quality, lowest prices, samples. C. Wooley, 376 William St., East Orange, N. J.

QSL cards, message blanks, wall cards, stationery, etc. Hillcrest, Cranesville, Pa.

HAND-made standard 866 firsts. Specially tested transmitter tubes. Unconditionally guaranteed for 60 days. \$3. H. Payne, 147 Adams Ave., Elizabeth, N. J. W2FY.

ECONOMICAL crystal control! Oscillating blanks \$1.25. Finished 0.1% your specified frequency \$3. All crystals and blanks guaranteed. W8AKU, Pittsburgh, Pa.

CRYSTALS, powertype. Accurately ground, calibrated, your approximate frequency, \$4.50. W2CNR.

GREATEST values obtainable. Nationally known makes. Microphones 44c. With polished stand \$1.02. Hook-up wire 27c lb. Two way telephone kit, genuine parts complete with instructions \$1.69. March special — 11 assorted 2 mid. metal encased condensers, 400-700 d.c. working voltage, only \$2. Send stamp for catalog and suggested ham uses. Engineering Service Company, 1718 S. 14th St., Lincoln, Neb.

FOR sale: Leeds 75 watt a.c. and d.c. CW transmitter, equipped with plug-in coils. Meter range 35-100. Never used. Price \$250. Write Transamerican Airlines Corp., City Airport, Detroit, Mich., care W. L. Jenks.

NEW prices class B — pair 210 — \$8.50, 203A — \$13.50, 204A — \$22.50, 10,000V 866s — \$3.25 new. 2.5V c.t. fil. transformer for 866s-\$2.50. Brand new RCA 250s-\$2.25. Quarter kw SG tubes \$18.00 used. Shielded single button mike transformers, exceptional quality \$1.50 new. .002-5000V Sangamos .45. Most all ranges in Weston 301 milliammeters \$3.75 new condition. Stamp for list. Cash for transmitting equipment. E. Ewing, Jr., 29 S. LaSalle St., Chicago, Ill.

CRYSTALS, guaranteed 0.1% frequency specified, \$5. Joe DuPre, Beachwood, N. J.

FOR sale — Pilot a.c. super wasp K115 with power pack K111. \$35. Crystals, 85 or 160 meter band, \$4.50. VT866 tubes, \$2.85. 20% with order. Balance C.O.D. Lowell Ecker, Sedan, Kans.

QSLs two colors 100 for 90c. Prompt service. Samples. QSL Service, 2220 Linden Ave., Baltimore, Md.

QSL's Lithographed, 1500 for \$4.50. Design own card, say all you want, no extra cost. QSL Service, 2220 Linden Ave., Baltimore, Md.

PAM 17 amplifier 1-27, two 210s, 1-81 with new tubes, \$28. 300 watt Janette converter, 110 d.c. to 110 a.c. \$20. Write — DeCoster 205X heavy duty dynamic speaker, like new \$24. No. 9 large horns to match, \$12. Best theater pickup, \$5. Cy Otterholm, 877 Flandreau St., St. Paul, Minn.

SELL — two new Westinghouse type 203As \$14.20, new 204A \$75, used 211D \$8. Express collect. Metals, accessories cheap. List. W9DWA.

CRYSTALS, Brazilian Quartz. March only. Finished crystals. \$3.95. Blanks, \$1. C.O.D. Bill Threm, 68 E. McMicken Ave., Cincinnati, Ohio.

TRADE used transmitting equipment W. E. fifties and two fifties for photographic equipment or cash. W8DAT, Bay City, Mich.

OMNIGRAPHs, Teleplexes, Instructographs, receivers, tubes, meters, Vibroplexes, transformers, converters. Bought, sold, traded. Ryan Radio Co., Hannibal, Mo.

NEW UX210s, UX250s, UX281s. Transmitter tested. \$1.10 each. Brewster Radio Co., Grafton, N. H.

R.F. chokes. See our ad, page 79 November QST. D & T Products Co., 68 E. McMicken Ave., Cincinnati, Ohio.

FOR sale: complete dx station, a bargain. Write for particulars and photograph. W9FHT.

TRANSMITTING and receiving equipment precision-built. Eastern Radio Labs., H. O. Barchdorf, Adams, Mass.

BEAUTIFUL hand painted shack posters. 14" x 14", 50c each. W8AKY.

210 TNT transmitter, 500 volt, p.d.c. power supply, complete, tubes, key, etc., \$17.50. Receiver, June QST hook-up, with tubes, \$17.50. 2 r.f., det., 2 audio receiver with tubes, \$20. V. H. Becker, Susanville, Calif.

WANTED, one copy first issue QST. Will pay \$12 if in good condition. Mail to Fred Elser, care Fred Mitchell, Carlsbad, Calif.

WE are interested in contacting with amateurs in various parts of the country who have a following among other amateurs with a view to selling on a commission basis, a product of proved merit and of especial interest to all amateurs. Morrill & Morrill, 30 Church St., New York City.

SELL — Readrite No. 700 analyzer, new \$10. Weston laboratory type d.c. milliammeter, 0-150, 0-15 range, cost \$75 new, only \$20. W2BMO, Harold Fread, 87-40th St., Irvington, N. J.

QSL cards? World's finest! Variety! Samples? W8DED, Holland, Mich.

CLASS B audio and modulation transformers. Any design. Impedance measurement furnished. Radio Service Laboratory, 3135 Eden Ave., Cincinnati, Ohio.

SELL — Jewell 10 amp. r.f. pattern 33, 500 mills, 552 tube. Other surplus. Write Hoesa Decker, Delaware, Ohio.

SELLING — Kennedy Universal receiver with amplifier. Perfect. \$50. W9DHT.

MODULATION APPARATUS. A new system of plate modulation that we have recently developed enables you to put a high quality signal into the air at a surprisingly low cost. For \$49.50, we furnish you with a power supply, audio amplifier, modulation apparatus, eight tubes (Cunningham) and microphone — everything necessary to modulate a pair of '10's. Built throughout of new, dependable parts. Quotations on higher power jobs upon request. Baker Engineering Laboratories, 2131 Curdes Ave., Ft. Wayne, Indiana.

QSLs made to order, 200, \$1.85. Samples. T. Vachovets, Elmford, N. Y.

W8BAH says: The large number of inquiries and orders we have received prove that QST Ham Ads are really read. Let me help you purchase your parts O.M. Write for price on the parts you want or send 25c for full set catalogues. Look for me on 3750 kc. W8BAH, Harry Tummonds, Northern Ohio Laboratories, 2073 West 85, Cleveland, Ohio.

UNPROFITABLE class B amplifier; simple modulation meters; information you need, coming in Modern Radio. Subscribe now. Trial subscription 75c. Modern Radio, Hartford.

CODE machine, \$9.85. Norman Shattuck, Winchendon, Mass.

HATRY and Young filament transformers, see page 85.

CRYSTALS: one inch sections 0.1 of 1% accuracy x cut \$6.7 cut \$4. Finished blanks, \$2. Money back guarantee. R. L. Tedford, 3838 Columbia Ave., Cincinnati, Ohio.

SELL, complete station equipment; transmitter, a.c. receiver, battery receiver, wavemeter. WIRN, So. Main St., Mansfield, Mass.

MONITORS, precision made; calibrate accurately, any band; Cardwell 201E, National type N dial, CX330, 45v. "B," enough "A" for continuous monitoring, aluminum case, 5x6x8. For information, John R. Skrondal, 80 Mt. Vernon St., Ridgefield Park, N. J.

SELL complete new amateur station with a.c. a.g. receiver, PP245 xmtr, monitor, 375 volt power supply, and tubes, for \$45. Or any unit separately. W9DKF, Peoria, Ill.

PHONE-men: Get ready for the new phone bands with a good crystal. See our ad below. Precision Piezo Service.

POWER crystals: Highest quality quartz crystals scientifically ground for maximum power. Guaranteed. "X" cut one inch square within 0.2% of your specified frequency. 0.1% calibration. 1715 and 3500 kc. bands, \$5.50. 7000 kc., \$9.00. Plug-in, dustproof holder with jacks, \$2.75. Prompt shipments. Precision Piezo Service, 427 Asia St., Baton Rouge, La.

EVERYTHING in ham radio at lowest wholesale prices. Write Richelieu Radio Company, Owen, Wis.

TRANSFORMERS — 700 watt 1600-2400-5400 volt c.t. \$15. 600 watt 2000-3000 c.t. \$12.25, 400 watt 1500-2000-3000 c.t. \$10. 200 watt 1100-1500-2000 c.t. \$8.25, 700 watt 2000-3000-4000 c.t. \$14, filament, polyphase, 25 cycle transformers W9CES, Frank Greben, 1917 S. Peoria St., Chicago, Ill.

CLASS B modulation transformers, any tube. Rectifier Engineering Service.

TUBES — low prices on transmitting tubes of all types and ratings. Howard Tube Service, 5508 Fulton St., Chicago.

COMPACT, 3 tube, screen-grid detector, receivers. Completely shielded, excellent bandspread, \$11. C.O.D. Edbern Radio Co., c/o ABO, 1340 Merriam Ave., New York City.

THE QRG Crystal Laboratories were the first to bring guaranteed, accurately calibrated crystals within the reach of all amateurs. Improved methods have enabled us to reduce the price to \$4. each C.O.D. for 160 or 80 meters. Order your phone crystals now for the new bands QRG Crystal Labs., Roseland, N. J.

COMPLETE set of 5 copper tubing plate and antenna coils for push-pull xmtr, \$3.25, postpaid. W9DKF, Peoria, Ill.

DEPRESSION! Beautiful xtal xmtr, 510 in final stage, complete with separate power supplies, etc. \$45. A.C. super wasp, \$18. Push-pull xmtr \$5. W8CBG, Masury, Ohio.

RECTIFIER (miniature) for converting direct current milliammeter into alternating current voltmeter, \$3. postpaid. Leo Taussig, 1326A Gates Ave., Brooklyn, N. Y.

LOWER prices: National SW3, \$29.45, DCSW5W \$45.60, ACSW5W \$47.50, NC5W \$41.80, REL278 \$26.60. Biley crystals \$5.22, holders \$2.37. Prepaid Rectobulbs RS \$6.63. R81 \$3.32, Thermionic 866s \$2.85, WE509W phones \$4.75. All types RCA and WE transmitting tubes, cameras. Anything else. Henry's Radio Shop, Butler, Mo.

"SPARKS" presents 7 1/2 watt transmitters, power supply included, \$19.50. Write "Sparks," Skowhegan, Maine.

NEED cash. First \$25 takes new REL 278 receiver with coil. Low noise level. A wow for dx. WICPH.

TUBES: Good WE211E or D \$6. 212D \$15. All guaranteed. W8AKW, 3838 Columbia Ave., Cincinnati, Ohio.

CRYSTALS, \$4. W9ACO, West Lafayette, Ind.

MODERN radio is the useful experimenter's magazine. Edited by Kruse and Hatry. Articles by editors in every issue. Sample copy 20c. Modern Radio, Hartford.

QSL ca

257 Pa

100 Q

Will

School

good on

land, H

HAT

T.C.

range 4

motor,

antenna

Airlines

EXCEP

— 2 mi

1900 vd

want th

Morill

WANT

copies of

cisco Ar

\$20 rew

and pho

No. 19th

LIMIT

Lee, 281

WANT

price an

CONDE

cellent

for thr

Chapin,

QSL car

change,

QSLs an

QSLs, by

crystals.

QSTAL

full deta

Quartz

Diamond

50c. str

W1DJL

W6APT

Calif.

W6BRW

W8CAC

Ohio.

The

bers of

WIA

WIBA

WIBI

WICH

WIAL

WIDP

WIEH

WIES

WIFL

WISZ

WIUE

See

LEAR

Radio

operator

in the U

Our st

Runs to

New C

courses

Largest

G

844 Ho

QSL cards, two colors, \$1 per hundred. Free samples. W8DTY, 257 Parker Ave., Buffalo, N. Y.

100 QSLs, 90¢. Stationery, samples. W3BHG, 3536 Roland Ave., Baltimore.

WILL trade \$100 credit on International Correspondence Schools for radio equipment or will accept part cash. Credit good on any course including radio course. W7ASQ, 566 Highland, Helena, Montana.

HATRY and Young audio filters, see page 85.

T.A.C. custom built 50 watt CW and telephone MOPA. Meter range 450-800 meters. Operated on d.c. current. With dynamotor, key, tubes, 12 volt storage battery, antenna reel with antenna, and load inductances. Price \$600. Write Transamerican Airlines Corp., City Airport, Detroit, Michigan, care W. L. Jenks.

EXCEPTIONAL transmitting filter condenser values! Morrill — 2 mfd.-700 vdc \$1.50; 2 mfd.-1000 vdc \$2.50; 2 mfd.-1900 vdc \$5.10; 2 mfd.-2700 vdc \$8.10. For amateurs who want the ultimate in quality at the lowest price. Morrill and Morrill, 30 Church St., New York.

WANTED: January and May 1925, January 1927 and 1928 copies of QST. Also any other collection of radio books. Francisco Arnal, Civilizacion 80, Tacubaya, D. F. Mexico.

\$30 reward and no questions asked for return of portable c.w. and phone set stolen from residence of William G. Gunston, 3105 No. 19th, Tacoma, Wash.

LIMITED quantity of new RCA 852 tubes, \$17. each. G. R. Lee, 2818 Ross Ave., Alhambra, Calif. W6EZ.

WANTED: S.W.A.C. receiver bands, well spread. Give lowest price and description. C. A. Conklin, Madrid, Iowa.

CONDENSERS, General Electric oil filled 1.79 2800 V a.c., excellent for transmitter up to 4000 working voltage. Guaranteed three months \$15. each. Send for photographs. Howard W. Chapin, 17 Adams St., Ypsilanti, Mich.

QSL cards, send 15¢ for samples, new ideas, good printings. Exchange, P. O. Box 607, El Monte, Calif.

QSLs and stationery. W8AXD, Smethport, Pa.

QSLs, by W2AEY. Nuff sed! 338 Elmora, Elizabeth, N. J.

CRYSTALS: See our advertisement on page 90 before ordering crystals. Premier Crystal Laboratories, Inc.

QUARTZ—make your own crystal oscillators. Write us for full details. Direct importers from Brazil of best quality pure Quartz suitable for cutting into Piezo electric crystals. The Diamond Drill Carbon Co., 720 World Building, New York City.

Q R A SECTION

50c. straight with copy in following address form only:

W1DJL—Wm. H. Weppeler, 346 Spring St., Athol, Mass.

W6APJ—Robert G. Russell, Air Corps, Mather Field, Mills, Calif.

W6BRW—J. F. Smith, 1118 Emerson St., Palo Alto, Calif.

W8CAC—Alfred M. Weniger, 3010 Library Ave., Cleveland, Ohio.

W1MK, A.R.R.L. Headquarters

R. B. Parmenter, Chief Op. "rp"

The following calls and personal sines belong to members of the A.R.R.L. Headquarters gang:

W1AKW-W1KP Clyde J. Houldson "ch."

W1BAW R. T. Beaudin "rb."

W1BDI F. E. Handy "fh."

W1CBD-W9ZZF Clinton B. DeSoto "dc."

W1AL J. J. Lamb "jim."

W1DF Geo. Grammer "hg."

W1EH K. B. Warner "ken."

W1ES A. A. Hebert "ah."

W1FL G. Donald Meserve "dm."

W1SZ-W1BIZ C. C. Rodimon "rod."

W1UE E. L. Battey "ev."

MIDGET RELAYS

for remote control of
AMATEUR TRANSMITTERS

Time Delay Relay

For use with mercury vapor rectifiers. Adjustable thermal time element delays application of plate voltage. Relay operates on 110 volts, 60 cycles. $3\frac{1}{2}$ " x 4" x $2\frac{1}{2}$ " — Price \$12.75

Remote Control Relay

A two pole single throw relay. Coil operates on 6 volts, 60 cycles. $2\frac{1}{2}$ " x $2\frac{3}{8}$ " x $1\frac{1}{16}$ " — Price \$6.00

Keying Relay

A single pole single throw relay. Coil operates on 6 volts D.C. $2\frac{1}{2}$ " x $2\frac{3}{8}$ " x $1\frac{1}{16}$ " — Price \$5.00

WARD LEONARD ELECTRIC CO.
Mount Vernon, N. Y.

R.C.A. VICTOR HAND MIKES

Just the thing for your Phone Transmitter, Public Address System and Recording Outfit. List \$18.00. Special.....\$2.95

POWERTONE CRYSTAL HOLDERS

Dust Proof. Plug-in Type.....\$1.75

SANGAMO TRANSFORMERS

Audio 3-1 Ratio. Special.....\$1.55

Input Push Pull. Special.....1.75

Output Push Pull. Special.....1.75

Thordarson Output Push Pull.....\$1.50

Thordarson 2-1 Audio.....1.95

Thordarson 1-1 Audio.....1.75

Thordarson Interstage Push Pull.....2.75

Thordarson 30 Henry 85 Mill Chokes.....1.45

AMPLION HAND MIKES, \$3.75

W.E. 1 Mfd 550 Volt Condenser, \$3.35

AMERICAN AND POWERTONE MIKES

Double Button Hand Mike. List \$23.00. Special \$11.75

Double Button Stand Mike. List 23.00. Special 11.75

Double Button Stand Mike. List 50.00. Special 24.95

Double Button Stand Mike. List 73.00. Special 36.45

50 WATT SOCKETS. SPECIAL, \$1.45

—FOR THIS MONTH ONLY—

FREE \$1.00 pair of Test leads with every purchase of \$5.00 or over

Remler .00035 Condensers.....\$2.45

Remler .0005.....\$1.95

Esico Irons.....\$1.19

Signal Keys, K-112.....39c

R.C.A. Sockets for 866 or 210 Tubes.....\$2.95

Amertran De Luxe, 1st Stage.....1.65

Flechtheim 2 Mfd 1000 Volt Cond.....\$1.95 each

Flechtheim 0-300 or 0-500 D.C. Voltmeter.....\$1.95 each

TRYMO RADIO 177 Greenwich St. N. Y. C.

Any questions pertaining to Public Address Systems, S.W. Transmitters and Receivers gladly answered by our Radio Engineer, Mr. Frank Grimes

BECOME A RADIO OPERATOR

See the World, Earn a Good Income,
Duties Light and Fascinating

LEARN IN THE SECOND PORT U.S.A.

Radio Inspector located here. New Orleans supplies operators for the various Gulf ports. Most logical location in the U. S. A. to come to for training.

Our students qualify for the various branches of radio. Runs to all parts of the world. Positions Ashore and Afloat. New Course in Radio Servicing and Repairing. Special courses, Day and Night Classes. Enroll any time. Oldest and Largest Radio School in the South.

Literature on request.

GULF RADIO SCHOOL
844 Howard Ave. New Orleans, La.

To Our Readers who are not A.R.R.L. members

WOULDN'T you like to become a member of the American Radio Relay League? We need you in this big organization of radio amateurs, the only amateur association that does things. From your reading of *QST* you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on the page opposite the editorial page of this issue. We should like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio. You will have the membership edition of *QST* delivered at your door each month. A convenient application form is printed below — clip it out and mail it today.

A bona fide interest in amateur radio is the only essential qualification for membership

AMERICAN RADIO RELAY LEAGUE
West Hartford, Conn., U. S. A.

I hereby apply for membership in the American Radio Relay League, and enclose \$2.50 (\$3 in foreign countries) in payment of one year's dues, \$1.25 of which is for a subscription to *QST* for the same period. Please begin my subscription with the..... issue. Mail my Certificate of Membership and send *QST* to the following name and address.

Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may send him a sample copy of *QST*?

Thanks

For Your Convenience

QST'S INDEX OF ADVERTISERS IN THIS ISSUE

American Sales Company.....	77
Areturus Radio Tube Co.....	75
A.R.R.L. Apparatus.....	74
A.R.R.L. Application Blank.....	94
A.R.R.L. Bound Volume.....	75
A.R.R.L. Handbook.....	Cor. II
A.R.R.L. Log Book.....	Cor. III
Blan, The Radio Man, Inc.....	89
Broadcast Service.....	81
Candler System Company.....	73
Capitol Radio Engineering Institute.....	79
Cardwell, Allen D.....	71
Central Radio Labs.....	75
Collins, Arthur A.....	87
Columbia Specialty Co.....	86
Cornell Electric Mfg. Co.....	89
Cunningham, Inc., E. T.....	70
DeForest Radio Company.....	1
Delta Mfg. Company.....	77
Electrad, Inc.....	79
Fox Amplifying Co.....	83, 85
General Radio Co.....	75
Gross Radio Company.....	96
Gulf Radio School.....	93
Harrison Radio Company.....	84
Hatry & Young.....	85
Hollister, Herbert.....	86
Hoodwin Company, Chas.....	89
International Resistance Co.....	72
Jacobs, Chas. F.....	89
Jewell Radio Company.....	76
Leeds Radio Company.....	67, 89
Littlefuse Labs.....	85
Massachusetts Radio & Telegraph School.....	83
Morrill & Morrill.....	81
National Carbon Company.....	Cor. IV
National Company.....	78
New York Laboratory Supply Co.....	77
Odeon Mfg. Company.....	87
Port Arthur College.....	87
Premier Crystal Labs.....	90
QST Back Copies.....	68
QST Binder.....	83
Radio Engineering Labs.....	2
Radio Supply Company.....	79
RCA Institutes, Inc.....	80
Rooney, John T.....	85
Sangamo Electric Company.....	85
Schwartz & Son, Maurice.....	88
Scientific Radio Service.....	73
Shalleross Mfg. Company.....	83
Telephoto & Television Corp.....	81
Teleplex Company.....	87
Thermionics Labs.....	73
Thordarson Elec. Mfg. Co.....	82
Trymo Radio.....	98
Uncle Dave's Radio Shack.....	69
United Radiobuilders.....	95
Universal Microphone Co.....	81
Vacuum Tube Exchange.....	83
Vibroplex Company.....	77
Wallace, Don C.....	87
Ward Leonard Electric Company.....	93
Weston Electrical Instrument Corp.....	4
West Side Y.M.C.A.....	88